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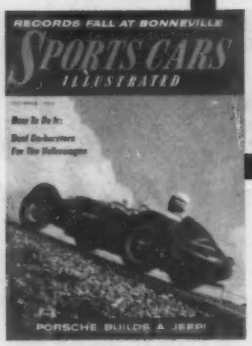
no. 6 vol. 2



That churning little car on this month's cover is a Crosley-powered Bandini, one of the storming 750 cc cars now coming into new popularity. Currently SCI is engaged in a round-up of these. The Ektachrome was shot at Mt. Equinox by Photographer Bob Halmi.

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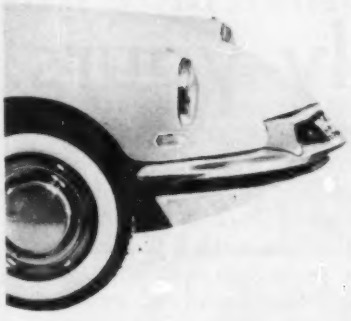

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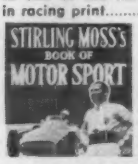

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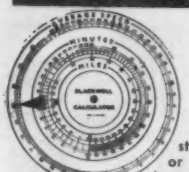

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very sincerely yours:

STARTING on page 10 readers will find the story of one of the most satisfying advances in automotive sport since the beginning of the sports car movement in the post-war years. It actually began back in 1949 when members of the Southern California Timing Association, pioneer amateur straightaway trials organization, made arrangements with officials of the Bonneville Association to run a week-long series of speed trials on the famous salt speedway. At the time there were classes for roadsters, coupes, lakesters and streamliners only —not a sports car, either production or special, in the bunch. This was not snobbery on the part of the SCTA but lack of interest on the part of the sports car people coupled with the fact that there just weren't very many sports cars around and those that were around were noted more for spaghetti than sauce.

By the time preparations for the 1953 Bonneville Nationals rolled around there were sports cars all over the place; more than enough to justify classes at the Nationals. At the suggestion of deponent and Dean Batchelor, designer of America's two record-breaking streamliners, the City of Burbank and the Shadoff Chrysler Special, the SCTA gladly set up not one class but four in which sports cars could run. What happened was somewhat shattering; the Larsen-designed Mabee special averaged 201-plus for a two-way record, albeit on alcohol fuel. Fuel or not, no sports car has bettered that mark since. For 1954 gasoline was made mandatory and rules were modified to conform to FIA specs with the lone exception that cycle fenders were permitted.

In just three years sports cars have become a major class with very little spaghetti and enough sauce to blister a rhinoceros at 20 paces. In fact, sports cars are going so fast these days that Bonneville is just about the only place they can be run flat out.

It's all very satisfying.

* * *

Something else that is very satisfying but also more than a little frustrating will be noticed in this issue. We're starting the book on page 10 instead of page 8 and if things look tight it's because they *are* tight. There's a good reason for this. SCI has grown so rapidly in the last eight months that readers are not the only ones to notice it. People with good, honest products to sell have also noticed it with the result that their advertising has gone up by better than 300 percent! In all modesty we can say that nothing has been lost; we've just packed the book, using the same amount of material. We willed the white space to the Bufferin folks. Similarly, circulation has also grown, by something over 100 percent in one year to be exact, making SCI the fastest growing and biggest selling sports car magazine in the country.

End of annual report—and thanks, folks.

* * *

Last month we reported that NSU had shattered the two-wheeler mark with a blistering 210 mph. They did it up first-cabin, too, with typical Teutonic efficiency and a fair expenditure of Western Reichmarks and then trotted off home with a great deal of satisfaction. That satisfaction was to be short-lived, however. Two weeks later, a couple of lads from Texas came up to the salt with a cigar-shaped two-wheeler and, comparatively speaking, no dough. They made a couple of runs to warm up and then calmly shattered the German record to smithereens, shaking the salt to the tune of 214 sizzling miles an hour! Next month we tell the tale of the Texans; don't miss it. Also coming up is a technical report on the record-breaking MG streamliner, a real kissin' cousin to the MG-A. The report will be complete with a LaTourette drawing and as a bonus there'll be a test of the "A" for comparison.

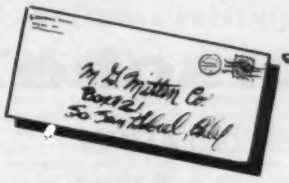
See you then.

* * *

Oh, yes; Merry Christmas—the Merriest.

— john christy

Do your christmas shopping by



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By MARION WEBER

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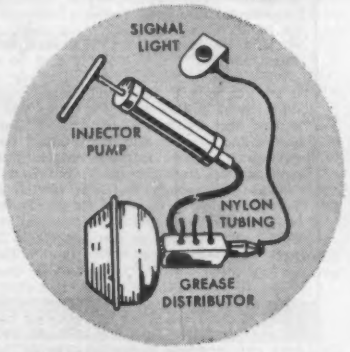

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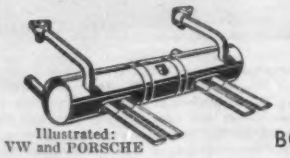

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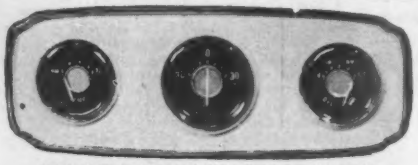

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letters

SINGER FAN

Dear Editor:

Got a question. In your article entitled "40 Easy Horses" (October '56), you list a number of Detroit "Dinosaurs." Among these you include OHV and plain Chevrolets. Excuse me, but what's a plain Chevrolet?? Am I missing something?

Secondly, much congrats on your *very* fine article, "The Bob-Tailed Bomb and the 1440 Minutes." It's one of the best race coverages I have ever read. More of this type, huh?

Next question—why doesn't anybody write articles about the poor little Singer. I am the proud owner of a 1500 Roadster and I am very well pleased with it, although it is only the single carb model.

Also, how about Singer's new DOHC engine?—same cubes but nearly 50% more hp. It's available only in the sedan, I believe, but how about a special?

Sincerely,
Ralph B. Neil
Tacoma, Washington

The symbol V8 was inadvertently left off the end of "OHV" – sorry. We'll have a Singer story one of these days; the editor owns a 1500-c on which considerable preliminary research has been done. There'll be quite a bit more before we're ready to go but to give you an idea—we have the full dope on Kelly Buchanan's OSCA-dusting Singer. The DOHC engine has unfortunately been shelved by Rootes and is unavailable at the moment.—Ed.

RACING TWO-STROKE?

Dear Sir:

Having read the article on the Offenhauser engine in the October issue of your fine magazine, I have come up with this question: Why hasn't a two-stroke cycle gasoline engine been built and run in competition? (A two-stroke cycle engine would develop approximately 75% more power than a four-stroke engine of the same cubic inches.)

Would you give some information on this subject in your next issue?

Your truly,
Jon Gilmor,
Nashville, Tennessee

It's been done—see the November, '56 Sports Cars Illustrated in which there is a story on the SAAB Sonnet, a real going two-stroke.—Ed.

END PLUG TROUBLE

Sir:

Re the letter from reader Raymond Dunlap, titled "Plug Trouble" in the October issue of Sports Cars Illustrated –I had the same type of trouble in my 1500 Porsche at 5000 miles. I went entirely through the fuel system, then electrical and ignition system with no luck. I could run anywhere from 2 to 100 miles and the miss would come back, especially on steep hills or under hard acceleration. I was already running "Lodge" CNP 14 spark-plugs.

Finally, I replaced the *spark wires* from distributor to plugs with "Belden" wiring–and have had no more trouble since then. Slitting the old leads open, I found the wires were corroded and coated; evidently the resistance set up within the wiring itself had caused the current to jump through the insulation and ground to the engine–causing the plug to miss. After several misses the plugs were too fouled to fire.

Since then, I've run across another Porsche and four VW's with the same trouble; re-wiring with a good quality wire has cured the trouble. The wife and I have just returned from a camping trip from Washington to Connecticut, then back out here. It was 7,135 *hard* miles in temperatures running from 50° to 100°, but we had no trouble, and we've put over 10,000 miles in since re-wiring.

Hope the above information may be of some help to others. Keep up the high standards and quality of Sports Cars Illustrated.

Sincerely,
Howard F. Miles
Northwest Regional
Representative,
Porsche Club of America
Tacoma, Washington

OPERATION BOOTSTRAP

Dear Sir:

I have been told that the less unsprung weight a car has the better it rides and holds the road. I would like to know how a car would handle and ride if the unsprung weight was reduced to zero or less. I am sure that I have a way to accomplish this and also to prevent body lean to a fantastic degree.

I would very much appreciate your answer.

Sincerely,
L. Carlton Thomas

Your question invokes another, to wit: What are you going to do with wheels, tires, etc? If unsprung weight could be reduced to zero you'd probably have to steer with a rudder. If you ever come up with less than zero weight, let us know first; we'd love to scoop AMAZING on the first antigravity device.–Ed

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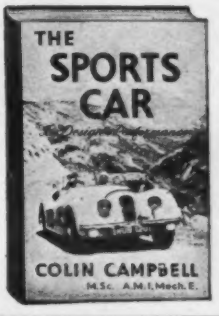

The Technical Correspondence Editor, January issue, Road & Track, in answer to a request for a good reference book on suspension and chassis design says: ". . . by far the best book is The Sports Car: its Design & Performance, by Colin Campbell . . ."

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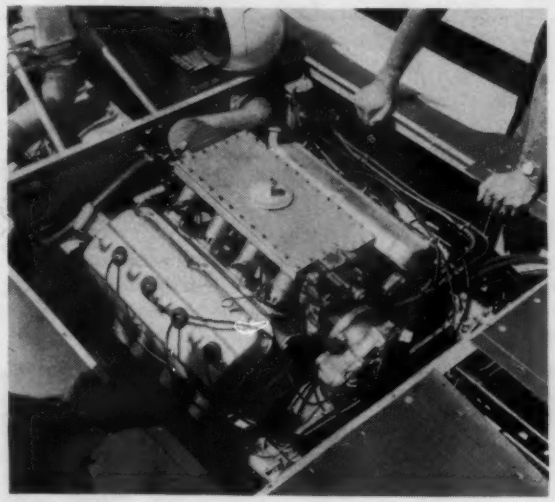
SPORTS CARS ON THE SALT

Sports car and hot rod records fall at the '56 Bonneville Nationals

The Bangert-Chrysler had the fastest open sports car time this year: 153.84. Move streamlined body wasn't delivered in time and car had to run as seen.

By GRIFF BORGESON



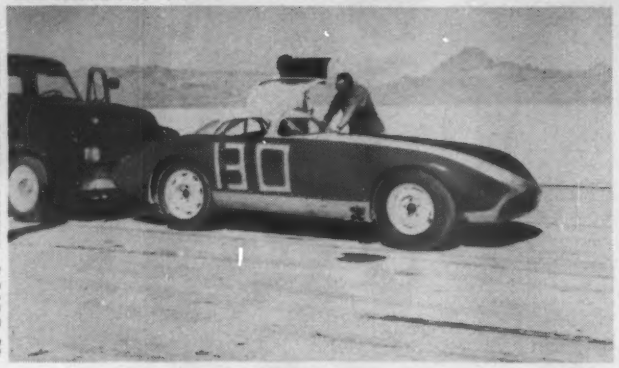
The Herda car's Chrysler engine drives one of the biggest blowers seen. Question is: how much power is left over after engine whirls blower?

The Herda-Cramer streamliner gets final check before run. Bolts in blower drive sheared several times. Overheating caused car to fail.

EVERY year in late August the gas-station-and-motel town of Wendover, Utah, takes a deep breath, swells, and nearly bursts at the seams. The few restaurants and motels suddenly are crowded with young men in white T-shirts, white pants or Levis, and big hats – the uniform of the nearby Bonneville Salt. And to the garages, gas stations and motel parking areas—anywhere there's room—come the roadsters, belly tanks, streamliners and well-warmed production cars entered in what is the greatest straightaway speed classic in the world—the Bonneville National Speed Trials. This year another element was important to Wendover's potent mechanical mixture: the sports car.

Sports cars have been entered in the last three of the eight annual Nationals but this year there were more than ever before; they made up 14 percent of the entries. And this is just the beginning. Jim Khougas, president of the able, dedicated, simon-pure-amateur Southern California Timing Association, which conducts the Nationals, says, "Sports cars are bound to be increasingly important to us in the future. When World War II ended we got high-performance cars by building them ourselves out of available production parts. But the components for these American specials—the hot rods —are beginning to run out and there's nothing in latter-day Detroit production to take their place. Also, the speeds are getting too high, in many classes, the stresses too great for the old solid-axle rail jobs; fond of them as we are. An obvious remedy . . . is the modern sports car."

This feeling generated much of the friendly atmosphere that sports car owners found when they arrived on the salt. One of them, William Scace, president of a Chicago power-



The Barnes-Larsen car. Engine was built by Ray Brown, and turned 350 bhp on gas. Car's body was constructed by Robert Sorrell. The car weighs 1600 lbs. and carries an Allard de Dion rear.

Tommy Thompson's "Golden Rod" returns year after year. Its mill is about the tamest on the salt, but with the aid of body aerodynamics, it turned a mean 189.77 mph.

Based on an Allard chassis, Lavell's car alternated two De Soto Adventurer engines—one with 341 and one with 357 cu. ins., and torque converter transmissions. Car walked through traps.

tool manufacturing firm, summed up their reaction neatly. "There's no strain between the hot-rodders and sports car fans up here. We respect them as *real* engineers—serious, inventive, practical and daring. They teach us a lot and they listen to us, too. Running on the salt with people as expert as they are—who talk your own language—is a rare experience."

Many sports car drivers and crews went to the salt for the sheer kicks of going fast under ideal timing and safety conditions. Typical of them was Oscar Breault, a retired gentleman from Chicago with a healthy Cad-Allard. On any surface but that of the ever-gentle salt, Breault would have run the tires off his car because he ran constantly, every day of the trials. He finally turned a very respectable 152.28, and when the gate to the salt was locked on the last day, he left a very satisfied sportsman.

Others, though, came with the firm intent of setting records in one of the four sports car classes so far set up by the SCTA (there undoubtedly will be more as sports car entries grow). One such determined contender was Albert Schmidt, an M.D. from Cincinnati. Dr. Schmidt entered his perfectly tuned 300SL in the closed-body, over-1500 cc class and for a long time proceeded to clobber all the competition around in scientific, methodical fashion. Except for some friendly brain-picking when he first arrived, Schmidt was seldom seen. He appeared briefly on the salt twice a day, in the cool of the morning and in the late afternoon, bothering to run only when his engine could breathe the densest possible fuel-air mixture. With competition cam and steel body, the middle-

Bill Scace's Porsche Carrera, with top erect, took the under 1500 cc closed sports car record at a two way average of 122.01. Masking tape was used to reduce turbulence in bumper region.

aged medic set a blistering two-way mark of just over 152 mph, thus giving a useful answer to the question, "How fast can an over-the-counter 300SL go?" Schmidt ran with even the stock mufflers in place.

Other production sports cars went well too. One of Scace's entries was a bright red 300SL which duelled from day to day with an orange Corvette driven by George Hanson and Ray Brock. Scace had to push hard to top the Corvette's 145.86 mph with 146.10. Jaguar was ably represented by William Woods, an electronics engineer from Glendale, who drove his XK120M with c-type engine—big carbs and all. The black coupe carried a neat and sensible modification. The right headlight was removed, and from the opening thus made available, two husky lengths of flexpipe carried cool external air to the car's induction system. Woods turned 131.38 in his about-town machine, a speed which failed to satisfy him but impressed everyone else.

Among the sports specials that ran in the over-1500 class,

Sports cars and hot rods waiting their time to take off down the salt. The Corvette in front was entered by George F. Hanson of Whittier.

The San Chez-Cagle-LeMion '53 Stude with Chrysler plant. Before piston seized, the car turned 185.18 one way on 95 percent nitro and 5 percent benzole. Note driver's position is in middle of car.

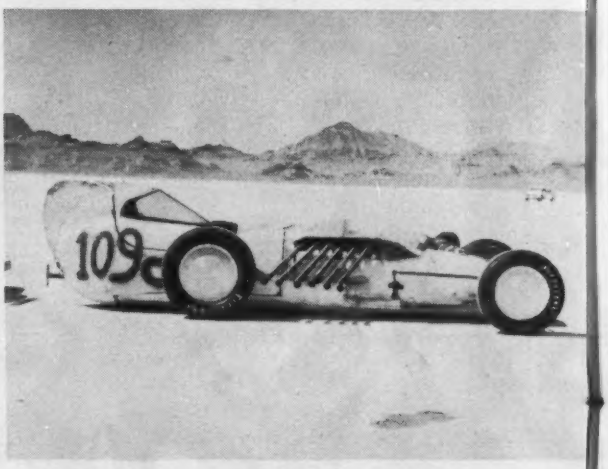
Fred Lavell's entry was outstanding for appearance and promise. Lavell, owner of a chain of women's apparel stores in the Midwest, is no tyro with machinery. His car had an Allard chassis, an effective-looking streamlined body, two DeSoto "Adventurer" engines with all the factory go-goodies, two torque converter transmissions, and an assortment of tires, wheels and gears. Early in the meet Lavell made a trial run through the traps with his "small" 341 cubic inch practice engine and clocked an easy 150.75. Everything appeared sanitary, so he switched to the 357 inch engine. Unfortunately, the big sprint power plant wound to about 3600 rpm and that was all. Lavell and his mechanics did their best but the engine's potential remained hidden. It ran hydraulic tappets, incidentally.

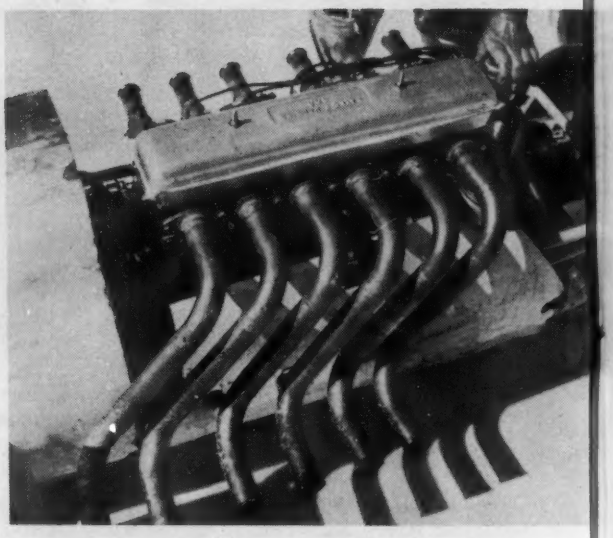
If the big DeSoto *had* gone properly it might have put Lavell in the same race with the car that set a new record in the closed sports car class: Denny Larsen's red-white-and-blue, gull-winged Chrysler coupe. Two years ago, when it was new, this car clocked a scorching 183 mph one way, coasting through the trap with a broken drive shaft. This year, driver Romaine Dauphin held the top speed to just under 176 during qualifying. The chassis sustained the strain and the next day he ran it at an easy 164.312 for the two-way record. Another Chrysler-powered mount turned the best speed in the open-body, over-1500 class. John Teverbaugh of Concord, California, hit 153.84 and should have topped 160 if the more streamlined body he had ordered had been delivered on time.

Oscar Breault came all the way from Chicago to try his J4 Cad-Allard on the salt. Getting in more runs than anyone, his best was 152.28.

Chuck Porter built odd looking nose for '27 T roadster belonging to T. Ruddy and M. Weinstein. Theory of front is that needle nose or wedge leaves too much room for turbulence between body and wheels. Theory worked—200.009.

Built by Brocchini, Semas and Shannon of Sacramento, this plastic bodied saltster blew its engine early. The boys borrowed a GMC and turned 182.87. No record, but they had a ball.





The big "Jimmie" Engine ran with injectors. Curves in exhaust pipes are to achieve proper length for scavenge tuning. Despite all the goodies, 12-port head car broke no records.

In the under-1500 class, Bill Scace's Porsche Carrera convertible showed the other cars the route. At first this car would do no better than 113 but Scace and his crew kept sharpening its tune. "We learned a lot about Porsches," Scace said. "For example, Dr. Porsche said a long time ago that the body would equalize at 60 mph—that the air pressure on the front end would create a 50-50 weight distribution. He was right. But he didn't mention that at 100 mph your front end gets heavy and the rear wheels begin to slip. Going north, with the wind behind us, we were getting 18.2 mph per 1000 revs but coming back we got only 17.7." This kind of salt-bred knowledge helped Scace eventually clock 123.39 one way and 122.09 for a two-way record average.

In the tiny-displacement category, C. G. Fink (entered in the SCTA's "lakester" class for streamlined bodies with exposed wheels) drove his immaculate 500 cc Triumph-engine Cooper through the traps at 94.83 mph and set a two-way record of 92.344. This was very good, but a performance that really shattered machinery-wise men on the salt was the incredible 198 mph achieved by Johnny Allen of Fort Worth, Texas in a streamlined motorcycle powered by an *unblown* 500 cc Triumph engine! A few days later he did even more.

This was an outstanding year for most classes of machinery, but not for the big streamliners. Bill Kenz and Roy Leslie of Denver, perennially the fastest on the salt and holders of the absolute SCTA record at 255.411 mph, came loaded for bear this time. Their car held three Edelbrock-equipped flathead Ford engines driving to all four wheels. Leslie drove the car on a qualifying run at a clocked 261.81 mph, but when he made his record attempt a driveshaft snapped. Time and facilities didn't permit its replacement.

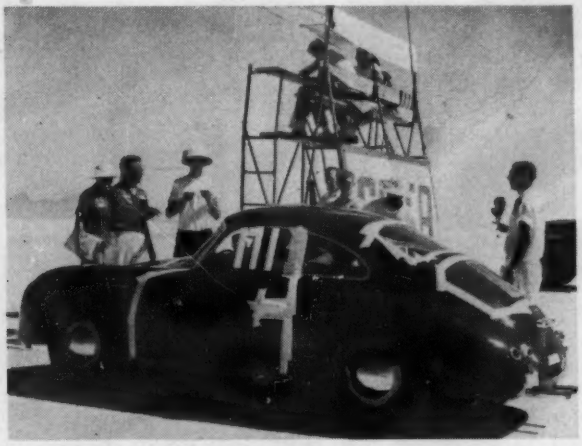
An equally promising machine was the supercharged, Chrysler-engined streamliner of Robert Herda and John Cramer of Redwood City, California. Herda is chief engineer for Hiller Helicopters; his machine has been under construction and development for six years and is a sort of ultimate in design and workmanship. But it was plagued with bugs that were invisible on the drawing board and crucially apparent on the salt. After several dry runs the Herda-Cramer "Attempt 1" loafed through the traps at 149.62. But this jewel had been brought to Bonneville to learn what could be discovered nowhere else. "We'll be back next year," Herda

Building a record-breaking streamliner is the highest challenge in this straightaway sport. Results usually take a lot of time and many builders are in no hurry. Tommy Thompson, for example, an engineering draftsman from Golden, Colorado, has been developing his Golden Rod since early in '52. In it he runs one of the mildest looking Olds engines you've ever seen, sleeved to 265 cubic inches and sporting two little twin-throat carbs. In '53 he turned 142.40 with this combination. In '54 he got up to 158.57 and in '55 to 165.40. This year, Thompson pulled out a couple of stops and resorted to a hot cam and a mere 10 percent nitro-methane. He clocked 189.87, a cozy speed. Next year, in his methodical way, he'll probably earn his membership in that exclusive group—Grant Piston Rings' 200 MPH Club.

Aside from these machines, most of the other contenders are best referred to in the pages of other publications . . . but not all of them. For example, the fact that a stock-bodied Stude turned 185.18 mph and set a two-way record of 163.715 is not likely to put any enthusiast to sleep. This was the entry of San Chez-Cagle-LeMmon and it was powered by an all-out 354 cube Chrysler engine running on 95 percent

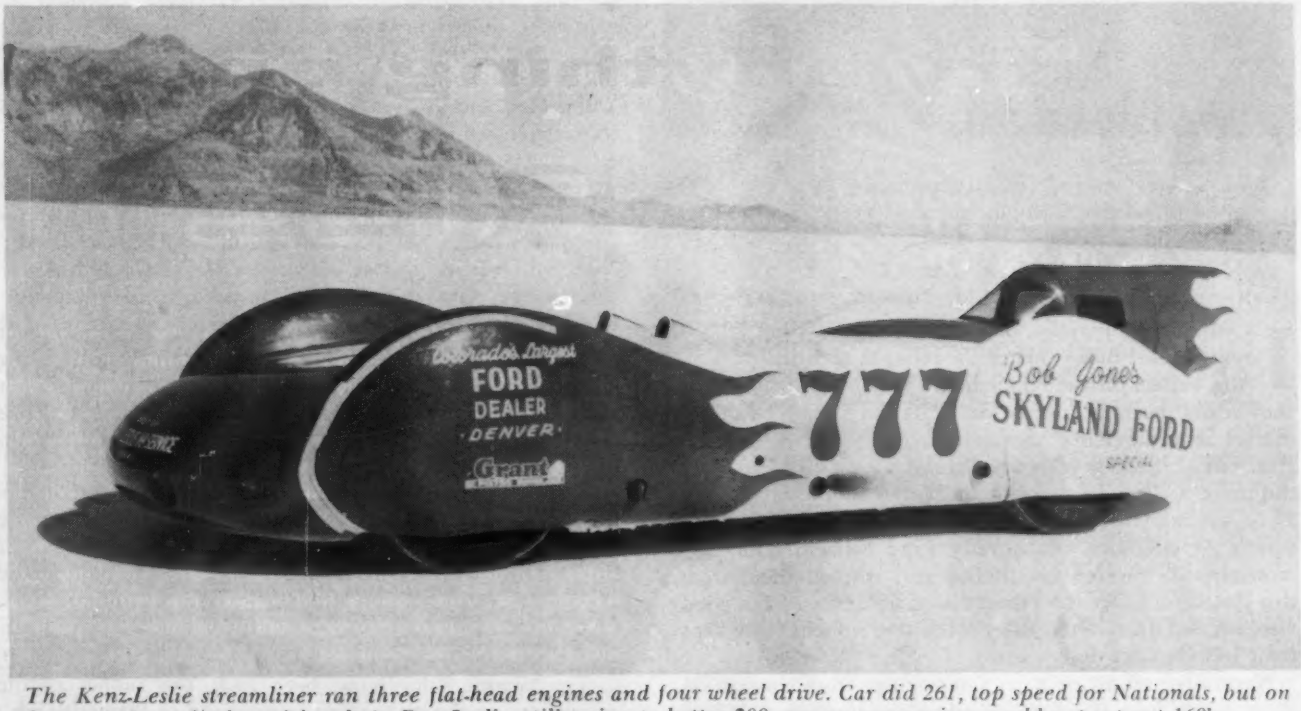
(Continued on page 52)

Oscar Breault gets last minute instructions before pushing his J4 Cad-Allard through traps.



This Porsche Carrera coupe, entered by Ralph Duke Stewart, turned a best time of 115.53. Again masking tape helped to cut turbulence in window and door spaces.

Dr. Albert Schmidt gets briefing from starter, Bob Higbee. The 300 SL was excellently tuned, and ground out best speed of 146. 10 mph. Car had steel body but had competition cam.



The Kenz-Leslie streamliner ran three flat-head engines and four wheel drive. Car did 261, top speed for Nationals, but on first record run broke a drive shaft. Roy Leslie, still trying to better 200, ran on one engine—could not get out 160's.

the "try anything once" RILEY

By DENNIS MAY

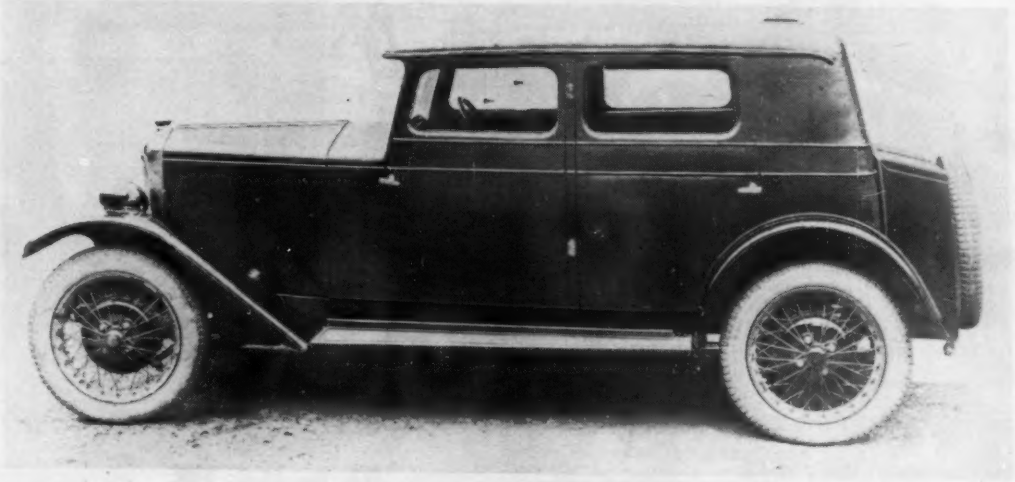
IN automobile practice, originality has always been a red rag to John Bull – hence the reliance of British motoring writers on the euphemism "well tried" when what they really mean is "out of date." It is therefore a minor marvel that the Riley people didn't innovate themselves clear out of business years ago. In the late 30's, indeed, they did make a short stopover in the Valley of the Shadow of Debt, probably as the result of their well meant efforts to surfeit the customer with novelty. Lord Nuffield, it may be remembered, lowered the lifeline that rescued them from this jam, and under the rationalizing influence of the good viscount and his cabinet, Riley folks have subsequently kept their feet on safer design paths.

Naturally, not all of Riley's departures from convention drop neatly into the pure classification, invention. When, as inevitably happened once in awhile, the Muse ran her batteries down, they weren't above exhuming and dressing up an old idea that somebody else had tried and either junked or failed to develop effectively. Yet the fact remains that their record of bona fide pioneering is probably unsurpassed by any British marque except Lanchester.

In 1896, Riley scored a world premiere with mechanically operated inlet valves. Eight years later the company originated the centerlock wire wheel. The first Riley built after World War I, in 1919, had brakes with automatic takeup and turbo cooling. This model also featured adjustment for steering column rake and two-plane regulation for the position of the front seats.

The famous Riley Nine, born 1926, put rubber engine mountings on the map, seven years ahead of Plymouth with

The Riley Nine was designed purely for family use but by the time the knot-farmers, both professional and amateur, were through it had given the MG people fits and copped a still unbeaten LeMans record.



The 1929 Riley Nine Monaco was the sensation of its day, and is remembered as the car that split Riley history into two categories—pre and post 1926. First editions of the Nine had separate cylinder and crankcase blocks.

their much acclaimed Floating Power system. Every Riley built since W. W. 1 has had four-speed transmission, and the original Nine (its name derived from a quaint system of nominal horsepower on which automobile taxation used to be based in Britain) was the first British car with a silent third ratio.

As far back as 1930 Riley had grouped and centralized nipples for chassis lubrication, with a network of ferrous arteries that took care of everything except the wheel bearings and one end of the front springs. This was superceded shortly afterwards by an authentic one shot system fed from an under-hood oil reservoir and animated by a plunger alongside the steering post. Almost a quarter of a century later, in 1956, Packard expected Clipper owners to use the hand gun on no less than 28 individual fittings – involving quite a feat of pedestrianism – once every thousand miles. (Meanwhile, it is only fair to add, Riley has long since abandoned its homely essay in automation; its sole model in current production, the 2½ liter Pathfinder, has to be gunned at 16 points at 1000-mile intervals.)

Technically, Riley history falls into two distinct chapters; pre and post-1926. It was in the fall of '26 that the small but enterprising plant at Foleshill, Coventry, tossed their existing engine blueprint on the fire and came up with the hemisphere-headed layout that has distinguished every Riley built from that day on.

Invention, as such, played no part in this metamorphosis. Anyone wishing to play it down could point to the fact that an engine of roughly similar architecture had powered the Belgian Pipe racing car of 1904. Long before '26, moreover, it was regular practice in the motorcycle world for ohv engines to have their valves sharply angled in a hemispherical head. Too, Henry's twin-camshaft Peugeots of around 1912 had established this combustion chamber shape as the optimum for output relative to displacement.

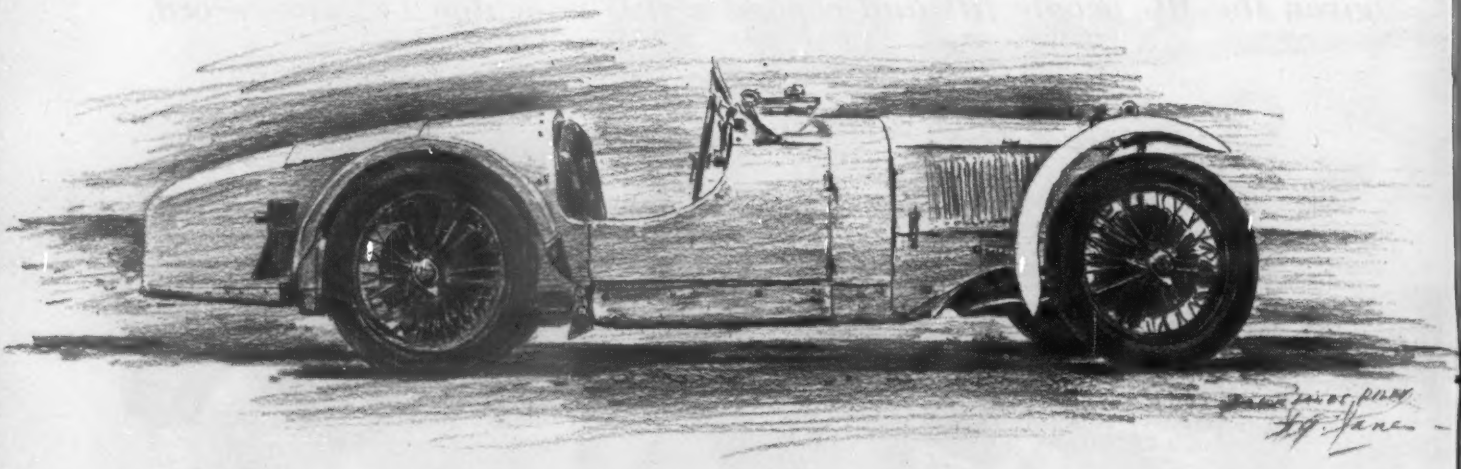
But it nevertheless was left to Percy Riley, designer of the Nine and its closely related descendents, to devise an interpretation of the classic top-end form which would reconcile

The Bi-posto Riley trike of 1905. The passenger, whoever he or she was, rode nearest the accident.

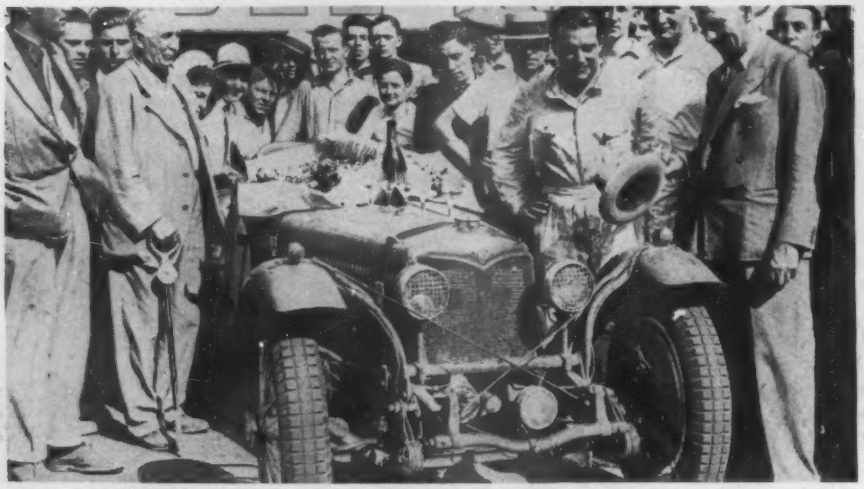
the conflicting demands of high efficiency, simplicity of manufacture, easy servicing and reliability.

First editions of the Nine had separate cylinder and crankcase blocks, these units being thereafter combined in one casting. Evidently forseeing a future for his engine in the racing and record breaking fields, Percy Riley dimensioned it at 60.3 by 995.2 milliameters, making the capacity 1089 cc and putting it just inside the international Class G limit. The four-throw crankshaft was supported in two bearings only, the front one and its housing being detachable, and leaving a porthole big enough for the insertion of the crank from this unusual direction during assembly.

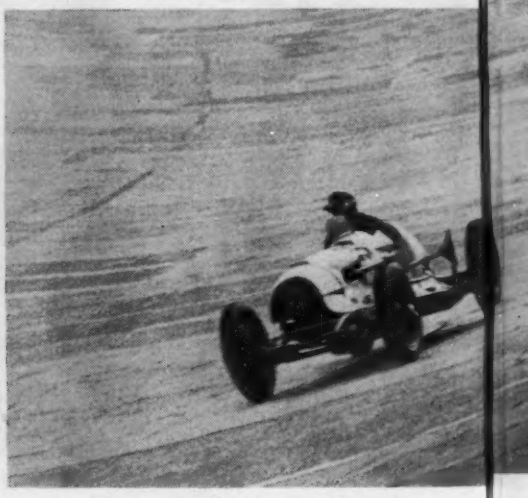
The two camshafts, carried high in the shoulders of the block, were driven by helical gears from the nose of the crank, via an intermediate idler wheel. The cast-iron head was detachable and carried two valves per cylinder, inclined



Designed by JG Parry-Thomas, the Brooklands Riley was one of a string of hot-rodded Nines that scourged the 1500 class.



This 1933 Riley at Le Mans was the smallest engined car ever to finish in the first three in overall classification. The car gained the highest index figure of any car in the history of the Le Mans 24 hr. race.



At the old Brooklands track, a supercharged ERA chases an offset bodied single seat unblown Riley.

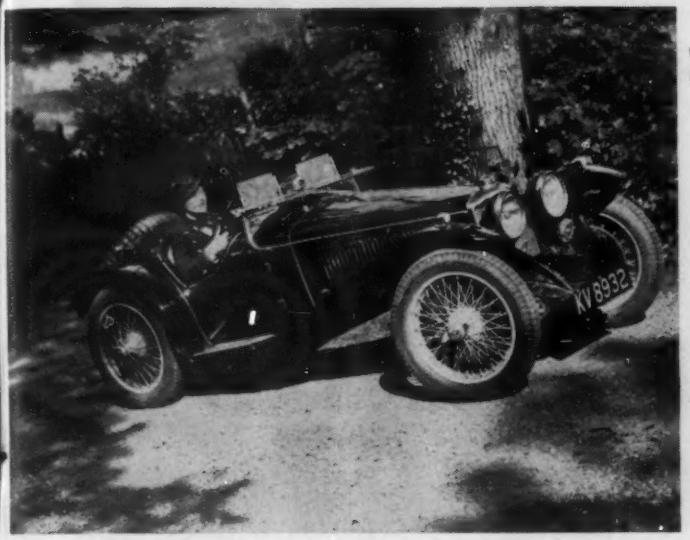
at a right angle to each other. Inlet and exhaust rockers ran on separate spindles and were operated by solid pushrods. Combustion chamber roofs and both batteries of valve ports were machined to a finish that most manufacturers today, on either side of the ocean, would probably consider uneconomically hygienic, but which was no better than average by the standards that Riley (Coventry) Limited prided themselves on in the 20's. Spark plug position was central between the neat and symmetrical rocker boxes, and thus completely accessible.

Early Nines had a single carburetor at the aft end of the manifold, probably resulting in marked peculiarities of charge distribution. Later models sited the carburetor or carburetors — two were fitted on sports variants — more rationally. Similarly, in the ignition department, the founders of the Nine line drew high tension current from a gear driven magneto, but a switch was soon made to a coil and distributor.

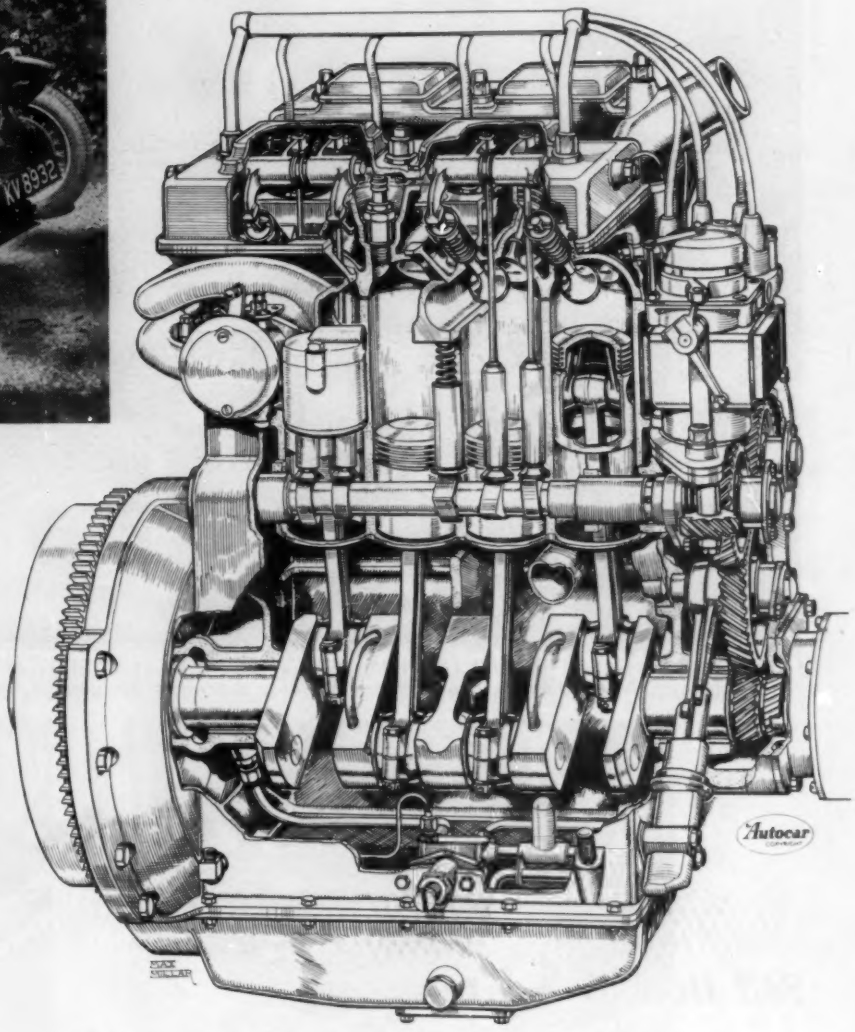
Standard output was 34 bhp at 4000 rpm, raised to 41 horses at 5000 with twin carbs. Racing engines running on ordinary gas would turn up 55 bhp at 5500 (while an alcohol fuelled sample with a compression ratio like a seizure, and with sledgehammer cams, once gave 99 horses, just briefly.

These yields all relate to unblown engines with the normal two bearing crank. It is a reasonable guess that the test personnel donned shining armor and retreated into the outskirts of Foleshill during that 99 bhp burst, because the crank, without benefit of midship support, was milling around at 6300 a minute. To the best of my memory and researches, only one 1100 cc Riley was ever modified to take a center main bearing; this was a spring rig known as the Appleton Special, which, with Zoller blower, produced the consoling output of 185 bhp at 8500. As the make-over cost constructor John Appleton the sterling equivalent of more than $15,000, no doubt he needed some consolation. Although, of necessity, very narrow, the customized middle bearing was no less than 5½ inches in diameter.

While the crank and con rods of the Nine were on the slight side from the modern point of view (journal diameter, 1½ inches) and must have assumed free-form shapes under heavy load and high turnover, the main engine casting cer-



One of the most rakish cars of the '30's was the Riley Imp eleven-hundred.



Splitaway of the Riley Nine shows camshaft gearing, valve train, crank throws, and two main bearings. Note long con rods giving long stroke.

tainly wasn't short on rigidity. The symmetry lent by the disposition of the two camshafts made it unusually resistant to heat distortion, and bore wear was slow in consequence. The same goes for the two sizes of post-war Riley engine, which inherited the old Nine's basic design; an *Autocar* reader has told, in circumstantial detail, how his 1949 1½ liter model went 128,000 miles on its original bores. Bigger, slower turning Detroitware would naturally beat that for longevity, but direct comparisons between such fundamentally different plants are hardly valid.

Percy Riley's flexible engine mounting, like so many of his works, bore an individual stamp. A crossmember fixed fast to the chassis on each side, ran right through a tubular housing in the crankcase, the weight of the engine being carried on conical rubber bushings surrounding the cross-beam. Stern support, aft of the four-speed gearbox, which was built in unit with the engine, was also on rubber. This arrangement, while certainly lacking the rock-and-roll flaccidity of current counterparts, *was* flexible and *did* pioneer true insulation of the power unit from the chassis.

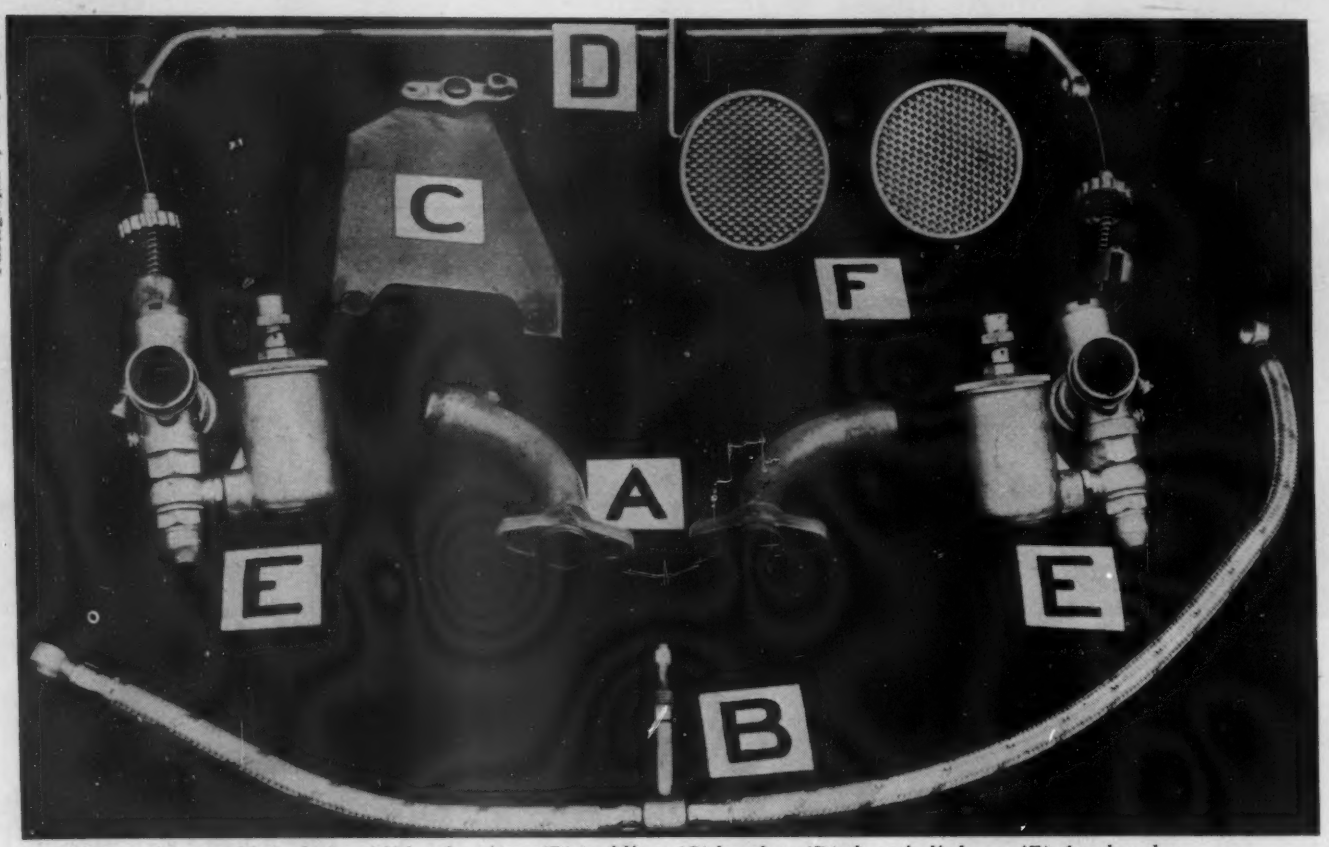
Further evidence of Percy Riley's concern to soothe the savage breast of his creation was seen in the pulsation damper he devised for his camshafts. Each shaft carried a supernumerary four-lobed cam which worked against a spring loaded plunger. A secondary function of this trivet was to abate noise from the timing wheels when they became worn.

Alex Taub once remarked in a scholarly appraisal of the hemispheric cylinder head that, for all its undoubted merits in terms of combustion and breathing, it had a "high roughness probability." Up to a point, this probability has been realized in all productions featuring the P.R. head. In fact, prior to 1951 and the birth of the Fire Power Chrysler it appeared that "inevitability" rather than "probability" would have been the *mot juste*. All down the line since 1926, Rileys of every size and type have produced better than average performance for their displacement; but it would be silly to deny (as no doubt the makers *would* deny, with ears laid back and the whites of their eyes showing) that their bigger bangs incur a certain loss of refinement.

The Nine engine's original mission was to power a small

(Continued on page 54.)

Photographs by Harry A. Solon



Complete carburetor kit includes: (A) intake pipes; (B) fuel line; (C) bracket; (D) throttle linkage; (E) Amal carbs; (F) air cleaners. Not shown are heat riser cover plates, miscellaneous gaskets, bolts and washers.

two to GO

SCI How-To Feature:

Dual Carburetion for the Volkswagen

BY AL OUTCALT

THE desire to boost the power of Volkswagen's air-cooled rear-mounted 36 hp engine, is understandable. The Volkswagen's biggest performance drawback is in the 33-55 mph range, where it badly needs more pep. What's more, the VW engine has plenty of room for souping. With its remarkably low piston speed of only 1254 ft/mile (at full throttle in high gear), it's almost an engraved invitation to modify.

Supercharging sounds like the logical step, and is — except for the problem of cost, a serious deterrent for many owners. But there is an in-between step, a less expensive modification which produces highly satisfactory results: dual carburetors.

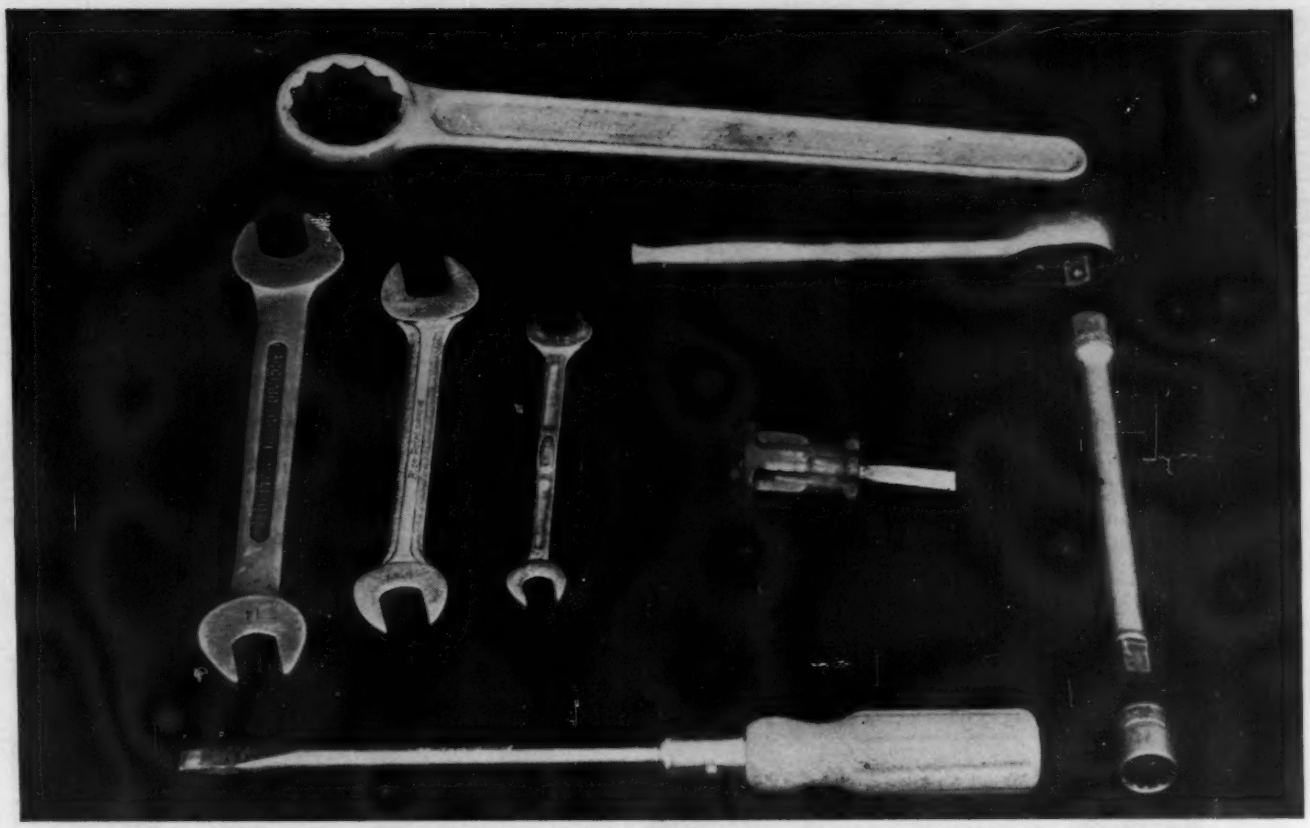
The kit installed on the author's 1955 Volkswagen by VW mechanic Bill Haupt costs $80 and is available from Competition Accessories, Iowa Falls, Iowa. It's made up of only nine basic parts; two type 22 carburetors of the kind used commonly on BMW motorcycles; two intake pipes, two air cleaners, a linkage support bracket, a fuel line and throttle linkage.

What dual carburetion does for a Volkswagen should satisfy most VW owners. Acceleration in the 35-55 mph range (in third gear) is improved by better than 25 percent; top speed is increased from a flat 70 to 76.1 (corrected). Zero to 60 time is improved by almost six seconds.

The most noticeable difference, however, is the upper range of each gear. You can wind it up substantially higher (see chart) in each gear, and get the advantage of increased power through the rpm increase. The car should really have a hotter cam to take full advantage of the increased range, but obviously this requires extensive work. (See Sports Cars Illustrated, July, 1955.)

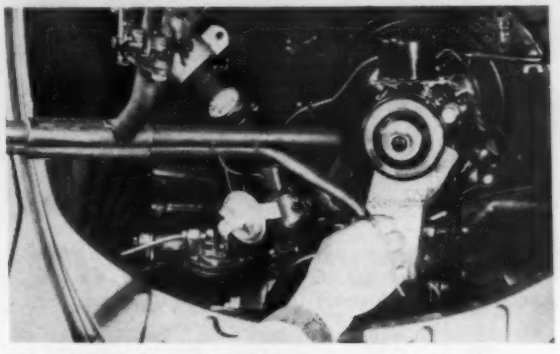
Over-all mileage was also slightly improved, but fuel economy was not as great at top speed as when the car was stock. The only real disadvantage discernible after installation was the noise level, which is considerably higher.

The installation is amazingly simple and requires little more than three hours. What's even more amazing is that



Tools needed for installation are: TOP: fan belt wrench; MIDDLE: open end wrenches in sizes 10, 12, 14, 15, 17 mm, stubby screwdriver, 3/8 inch drive ratchet wrench, four inch extension and 14 mm socket; BOTTOM: 8 inch screwdriver.

Disconnect fuel and vacuum line. Remove: screw at each lower end of the blower housing; screws at intake ring behind housing; generator, coil wiring. Lift housing with generator to get to intake bolts.



Unhook stock throttle linkage. Remove oil bath air cleaner from Solex carburetor, but leave carb in place. Lift out the manifold (and heat riser) along with the Solex.

the whole job can be done by one man using seven tools.

Before beginning, jack up the rear end of the car and remove the deck lid. This results in less bending over and provides easier accessibility. Stripping off the stock carburetor set-up calls for only four steps:

1) Remove the fuel line from the fuel pump to the carburetor, and the vacuum line from the distributor.

2) Remove the blower housing and generator. This requires removing the screw at the base of each end of the blower housing, loosening the two screws at the air intake ring behind the blower housing, removing the fan belt, generator strap and wiring.

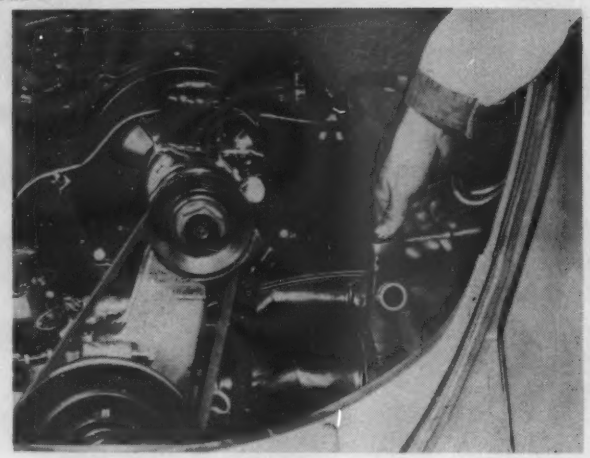
3) After removing the blower housing, unbolt and remove the manifold with carburetor attached.

4) Replace the blower housing and generator and you're ready to begin the installation. The accompanying photographs show the step-by-step process.

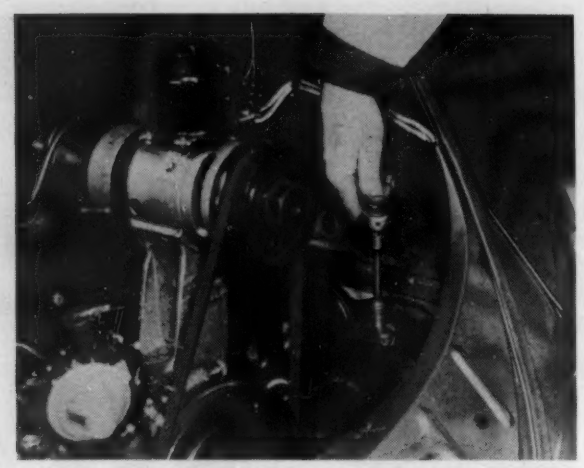
After the installation is complete, the only tough part of the job faces you: tuning the carbs.

Five main jets are available (sizes 150, 160, 170, 180 and 185) and three sleeves (5/5, 5/4, and 5/3). The long needle inside each carb has four positions. If the car spits back through the carbs, the mixture is too lean; higher numbered jets provide richer mixtures. If the car lags noticeably before picking up, the sleeve has the wrong opening; 5/5 offers the leanest mixture, 5/3 the richest. Finding the right sleeve will eliminate the lag. For each needle position (which is pushed down into the carburetor), the mixture is leaner.

Every Volkswagen engine is different, and only experimentation will produce the right combination of jets, sleeves and needle position. Since the jets and sleeves are relatively inexpensive, it might be more convenient to order all sizes to save time waiting for later delivery. After several hours of testing, the author's car ran perfectly on 170 jets, 5/4 sleeves and the needles in the highest or fifth notch.

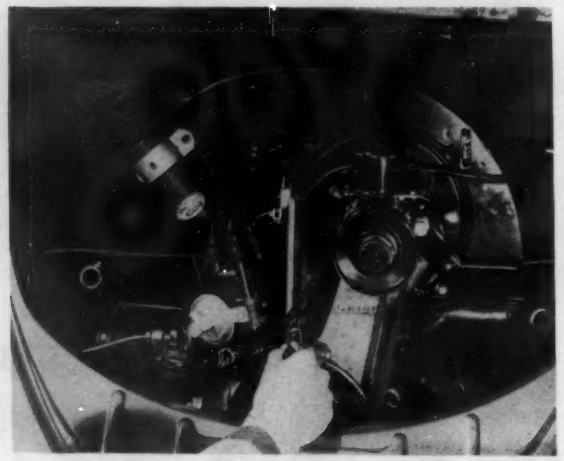


5 *Install intake pipes using same nuts which held down manifold. Be sure to replace the manifold gaskets with new ones to insure proper air-tight fit.*

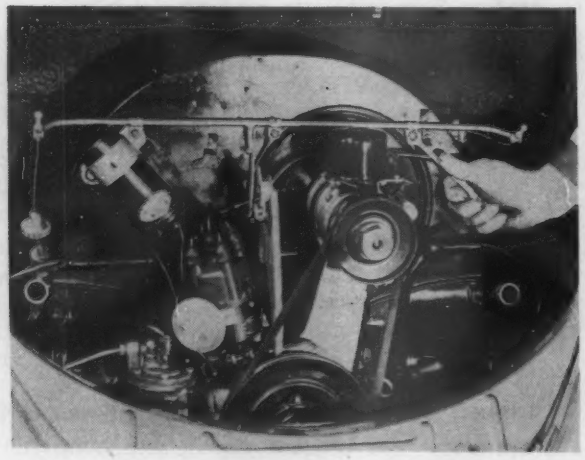


6 *Two small plates with asbestos gaskets are provided to cover the heat riser openings. Bolt these in place with the same bolts used to hold heat riser.*

7 *Next the linkage support bracket should be bolted onto the crankcase using bolts already on the crankcase. Be sure bracket is clear of pulley and belt.*

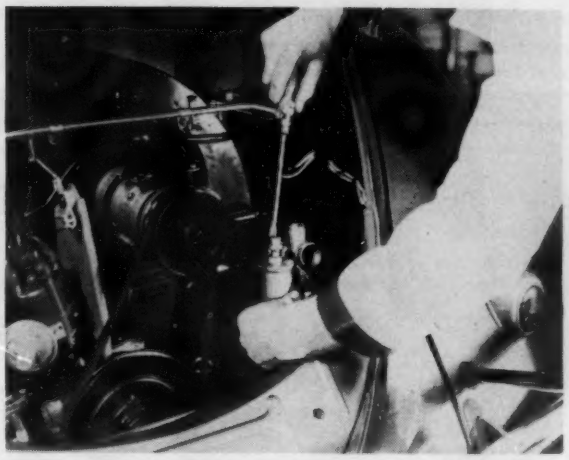


8 *A pipe clamp at the back of the linkage support bracket holds the high tension wiring conduit in position. Fasten it securely in place to avoid rattling.*

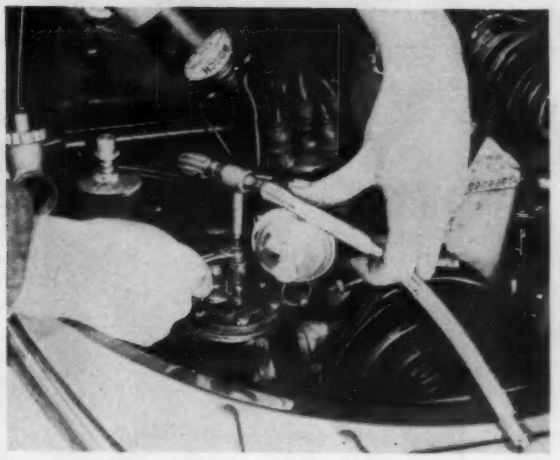


9 *Throttle linkage is bolted to blower housing. Be sure each clamp is separated with spacers provided, and guide pin (center clamp) is in slot.*

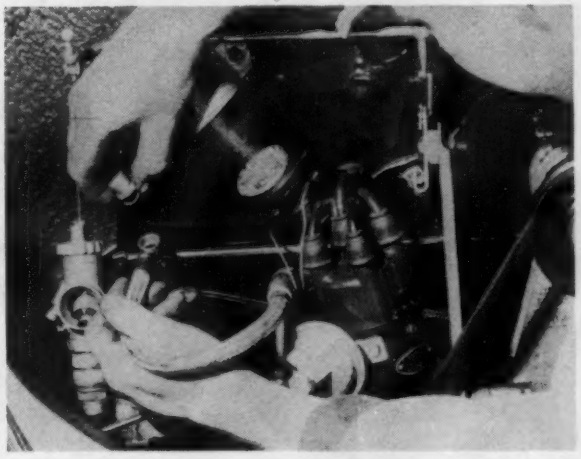
10 *Insert plunger, with needle, into each carburetor. Exercise caution here as fit is tight, but smooth. Do not force plunger. Tighten carb cover slowly.*



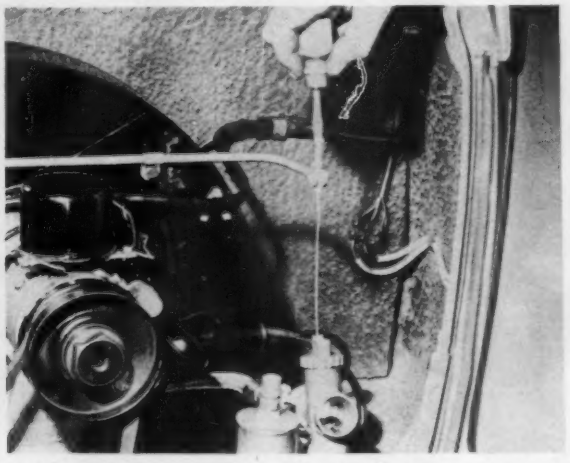
11 *Place carburetor on intake pipe, seat it firmly, and secure clamp with screwdriver. Be sure floats go to the inside. Repeat for other carburetor.*



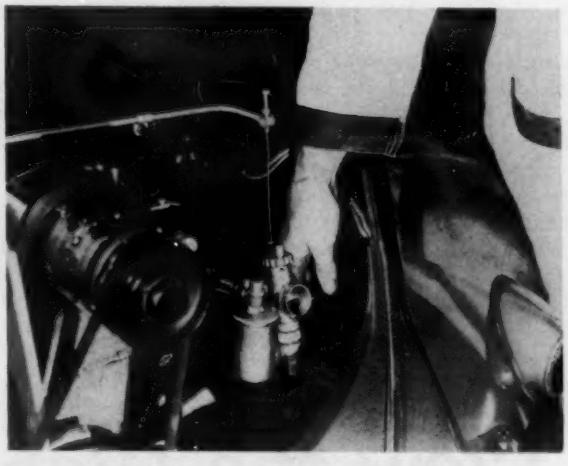
12 *Fuel line with nut and ferrule is inserted into the fuel pump and tightened until seated. In later models the fuel pump accepts 6 mm tubing.*



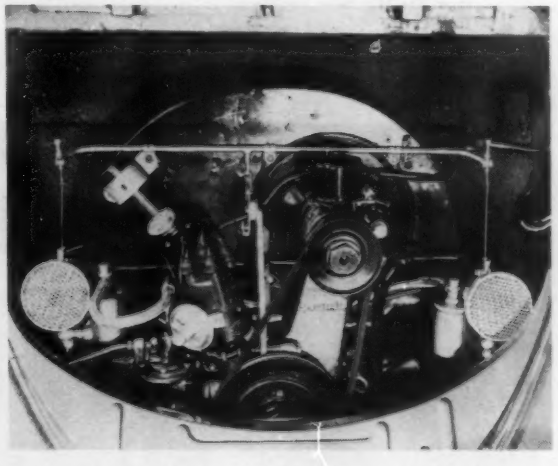
13 *Unbolt cap atop carb and remove 1 washer. Slip loop on end of fuel line over carb top, replace washer and replace cap. Tighten lightly with wrench.*



14 *Tension is taken up on adjustable throttle valve until throttle valves can rise simultaneously. Accelerator cable is then fastened to throttle linkage.*



15 *Synchronize carbs. With engine warmed, uncap plugs on one side. Back out piston screw (upper, diag. screw) 'til mill turns slowly. Tighten nut, repeat.*



16 *After air cleaners have been installed, experiment with various sized carb jets for proper fuel mixture. Performance should be considerably better.*

Battling for second place, the little white Bug driven by Friderich overtakes the Rolland-Pilain piloted by Gabriel.
Illustration by Carlo Demand
from The Big Race, courtesy
Robert Bentley

BY MERWIN DEMBLING

Bugatti type 13 engine shown here is almost identical twin of the Grand Prix car which amazed the Sarthe boys.

The Day Bugatti Slew the Giants

THE era of the 2000 pound, 10 liter, fire-snorting "racing machines" came to a screwball end one scorching July Sunday in 1911, at the wildcat Grand Prix de France. When that carnival of comedy and catastrophe had run its course over the 33.5 mile Sarthe-Le Mans Circuit, one French journalist rubbed astonished eyes, dipped his quill, and solemnly declared: "Never, since the first races at the dawn of the automobile, has one seen such a slaughter."

He was a little too dazed to realize it, but he had just seen David slay Goliath. A pipsqueak 660 pound, 1.3 liter voiturette, entered by a cocky young designer so little known that advance stories carried his name as Bergati and Babati, had wiped the track with tradition. It proved that a racing car didn't have to be oversize and overweight, and that while it was spectacular to be fast and furious, it was better to be fast and efficient. Though the newcomer only took a theoretical second place, experts recognized it as the racing car of the future. A few were so impressed that they even learned how to spell Bugatti.

Race crowds were ready for anything in those days when chain-drive juggernauts tore the top off roads that had no particular surface to begin with, and tire trouble was generally ignored until the lumbering lumps had shed their rims and begun hopping along on their spokes like dicky birds. Two drivers in an 1896 race dropped out when they were charged by a bull; another, in the same race, retired suddenly when a tree fell on him. In the 1908 Grand Prix, a contestant was treacherously torpedoed by the tread off one of his own tires, which sneaked up from behind and knocked him cold.

These were odd mishaps in otherwise normal races, but nothing in the 1911 Grand Prix was normal. Ten out of fourteen starters fell victim to mechanical disintegration, sudden death, thirst, and a furious attack by sun-crazed white butterflies. Only one car managed to complete the required twelve laps within the allotted eight hours, and when exasperated gendarmes finally threw the roads open to traffic, three cars still trying to finish were engulfed by enraged spectators.

1911 was the best possible year for Bugatti's epoch-making runabout to show its stuff against the big machinery. French manufacturers were so horrified at Germany's clean sweep in the 1908 Grand Prix that they signed an ironclad agreement to shun racing — a case of sulks that knocked out official competition in 1909 and 1910. By 1911, the populace was hungry for a little of the real thing, but the big manufacturers still refused to come out and play. A race might only prove how much better somebody else's product was!

Nevertheless, the Automobile Club de la Sarthe decided to scratch up a wildcat contest. Maybe the cars wouldn't be the latest thing, but at least they'd be big, and with nothing else worthwhile taking place in France, practically all the important drivers were available and eager.

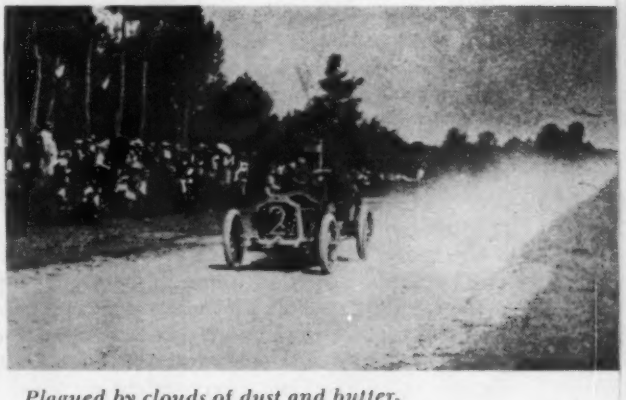
July 7th was pencilled in as the day, but near the end of June there were so few cars entered that it looked as though the drivers were going to have to put on short pants and run around the track. Private owners were reluctant to risk their vehicles in such a rough-and-ready event, and a trio of barnstorming Americans scornfully brushed off an invitation on the grounds that for them to compete against the old, sketchily-prepared cars that had signed up would just be taking candy from a baby. The Club called the whole thing off.

Then, encouraged by the promise of a Savannah Grand Prize F.I.A.T., they called it on again for two weeks later, with a new, vague formula: "Mechanical vehicles with four wheels." A gagster might have entered a trolley car, and the organizers were so hungry for starters they probably would have accepted it. What's more, it would have stood a better

(Continued on page 58)

Hémery, in his Fiat just after winning the race is congratulated by the SAC members who sponsored the event.

Friderich and mechanic after race. Poor mech looks beat after holding tire throughout entire ten laps.



Plagued by clouds of dust and butterflies (stuck to grille), Fournier and Louvel dog their last lap together.

SCI

ROAD TEST: The Simca Aronde

Front view of Simca Aronde shows typical narrowness as with small overseas cars.

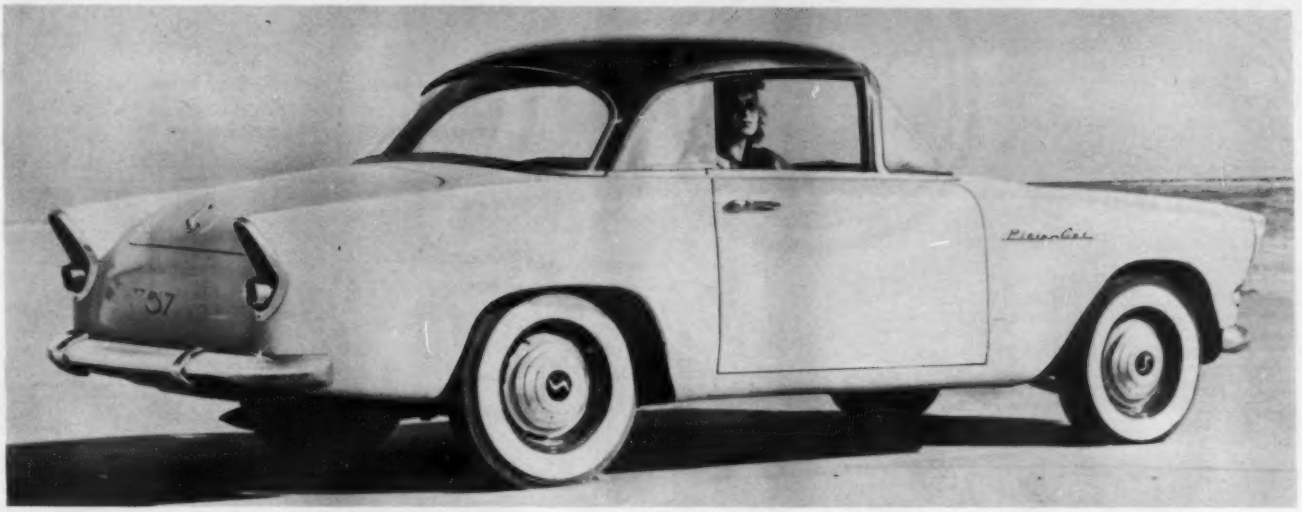
MOST sports cars are light, and plenty of cars in the light-car class have sports behavior; the man who drives both varieties frequently wonders where one leaves off and the other begins. The Simca Aronde 1300 is just such a borderline case. It has been raced with success in the U. S. and it feels as at home on a tricky race course as on the open road. It's as agile and responsive as a stock MG TD—has about the same acceleration, a shade more top speed, and is smoother and quieter. But Simca, in its promotion of the Aronde, does not attempt to make capital of the sporty side of this car's hybrid character.

What Simca is after, of course, is the biggest possible slice of the colossal "people's car" market, and in its own definition of the philosophy underlying the Aronde's design the factory lists only utilitarian virtues: Minimum original cost, fuel and upkeep cost and maximum vehicle life and performance under all conditions. Even the Aronde's good esthetic qualities are played down in Simca's pitch to the mass-motorist and the big emphasis is placed on the car as a workhorse.

Just how successfully the Aronde will be able to compete in the U. S. with the established English light cars and the firmly entrenched VW remains to be seen, but if sheer honest virtue is a factor it should really storm. Its speed, space, acceleration, comfort, roadability and price are all carefully aimed at making it the most car for the money built anywhere in the world.

Sports Cars Illustrated's test Aronde was the hard-top coupe, called the *Grande Large* model in France, which differs from the basic model only in trim, accessories and price. The test coincided with a great number of commuting trips between Los Angeles and the Bonneville Salt and we put 1900 miles on the car under a wide variety of road, traffic and weather conditions.

One of the things we learned on these long cross-desolation runs was that the Aronde produces a real minimum of



The 1957 Simca coupe. Envelope body and two-tone hard top are strongly reminiscent of American design — one in particular.

driver fatigue. The man who started at the wheel on the eastbound run has an old back injury that almost invariably gives him trouble after a couple of hours of herding a Detroit machine. He stayed at the wheel across the Mojave Desert and into Nevada, waiting for fatigue to set in. In the Simca, it never did. He drove all the way to Bonneville, 750 miles. The reasons for this really remarkable degree of comfort are the solid but smooth ride, seats that are deep and firm—giving good support to the back and thighs, the low level of mechanical and sonic vibration, and controls that are light but very responsive.

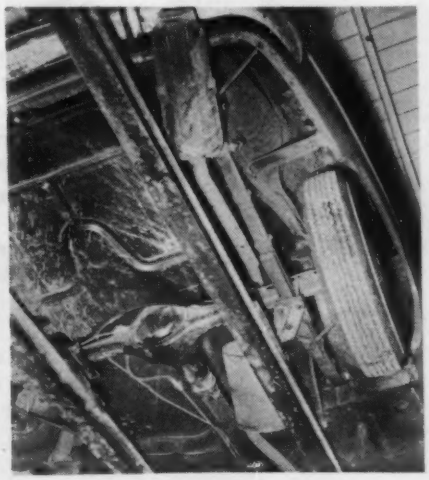
Another thing we learned about was the Simca's fuel economy. Across the long stretches of desert highway we cruised at an actual 60 to 65 mph and overaged 35.2 mpg—this, in spite of a small leak in the fuel line that wasn't discovered until we got back to Los Angeles. When the leak was fixed, a fast 88 mile run on highways and freeways yielded 40.8 mpg. If you drive for economy it shouldn't be at all hard to get 50 mpg in this car, and even driving flat out all the time you'd have a hard time getting less than 25 mpg.

With this kind of economy you'd hardly expect lively performance, but the Aronde has this too. The 1955 forerunner of the 1300, with a displacement of 1221 cc and three less advertised bhp than the present model, was criticized none too gently in the British automotive press for being underpowered and geared for flat, long Continental roads rather than the often rolling roads of England. Odds are, though, that this represented an excess of national zeal, because the 1300, with an increase of just 5.7 percent in displacement, 6.7 in bhp and 8.2 in torque, is one of the most capable and versatile performers in the light car field, and it's as pleasant to drive on steep mountain roads as it is on the level.

Its gear ratios are very well chosen, and synchromesh on the top three gears is foolproof; the column-shift mechanism, though admirably designed, could stand to be lighter in its operation. The loud-singing first cog lets you wind to about 21 mph before things begin to seem too tight. The silent second gear is good for an honest 40 and in third the brave little engine is perfectly willing to rev well beyond the actual 65 mph we chose as top limit in that gear. Our well loaded test car had to pull mountain passes over 6000 feet high, and for this and overtaking other cars on the

The power plant of the Aronde seems ordinary, and looks small as 12 volt battery. However, its virtues come from its power, economy, smoothness and its revving ability.

Rear end is conventional, but of heavy duty type. 42 inch long leaf springs have eight leaves plus two 5/16 inch overload leaves.



Spare tire is cleverly recessed in floorboard leaving full space in trunk for luggage, tools, and other small portable items.

PERFORMANCE

TOP SPEED:

Two-way average	81.8 mph
Fastest one-way run	82.6 mph

ACCELERATION:

From zero to	Seconds
30 mph	6.0
40 mph	8.8
50 mph	13.7
60 mph	20.0
70 mph	33.3
80 mph	104.1
Standing ¼ mile	22.3
Standing mile	55.8

SPEED RANGES IN GEARS:

	(Reasonable)
I	zero to 21 mph
II	5 to 40 mph
III	10 to 65 mph
IV	15 to top

SPEEDOMETER CORRECTION:

Indicated	Actual
30	26
40	35
50	45
60	55
70	65
80	75

FUEL CONSUMPTION:

Hard driving during test	25.4 mpg
Average driving (under 60 mph)	40.8 mpg
1900 mile average	35.3 mpg

BRAKING EFFICIENCY:

(10 successive emergency stops from 60 mph, just short of locking wheels: with Perfometer)

1st stop	70%
2nd	68%
3rd	68%
4th	65%
5th	64%
6th	62%
7th	60%
8th	58%
9th	57%
10th	55%

Loss of braking efficiency in tenstop test: 1 inch.

SPECIFICATIONS

POWER UNIT:

Type	In-line four
Valve Arrangement	Pushrod ohv
Bore and stroke (Engl. & Met.)	2.91 x 2.95 ins. 74 x 75 mm
Bore/stroke ratio	1.01 to one
Displacement (Engl. & Met.)	78.7 cu. ins. 1290 cc
Compression Ratio	7.2 to one
Carburetion by	single-throat downdraft Solex 32 PBICT
Max. bhp @ rpm	48 @ 4500
Max. torque @ rpm	66 @ 2600

DRIVE TRAIN:

Transmission ratios I	3.72
II	2.36
III	1.47
IV	1.00
Final drive ratio (test car)	4.444
Axle torque taken by	rear springs

CHASSIS:

Wheelbase	96 ins.
Front Tread	48.5 ins.
Rear Tread	48.5 ins.
Suspension, front	Coil spring and wishbone; ⅝ in. anti-roll bar.
Suspension, rear	Semi-elliptic springs.
Shock absorbers	Double-acting telescopic.
Steering type	Gemmer worm and roller.
Steering wheel turns L to L	3
Turning diameter	31.0 ft.
Brake type	Bendix hydraulic
Brake lining area	122 sq. ins.
Tire size	5.60 x 14

GENERAL:

Length	162 ins.
Width	61 ins.
Height	63 ins.
Weight, test car	2100 lbs.
Weight distribution, F/R	50.1/49.9
Weight distribution, F/R, with driver and passenger	50.4/49.6
Fuel capacity—U.S. gallons	10

RATING FACTORS:

Bhp per cu. in.	.61
Bhp per sq. in. piston area	1.80
Torque (lb-ft) per cu. in.	.84
Pounds per bhp — test car	43.8
Piston speed @ 60 mph	1856 fpm
Piston speed @ max bhp	2212 fpm
Brake lining area per ton (test car)	116 sq. ins.

Simca bores through test curve at an actual 60 mph. Car seems to lean heavily in picture, but actually corners quite flat.

open road we never had to drop to a lower gear than third; except for getting away from standstill, we used second only for quick departures from slow hairpin turns. In fourth gear, using a two-mile approach to the measured quarter mile, we clocked an easy 82.6 mph and it was obvious that the engine would have gone on revving higher if more space had been available.

It's enlightening to calculate just what the power plant was doing during the speed-in-gears runs. We're told that it develops its maximum bhp at 4500 rpm, at which piston speed is 2212 feet per minute. But it's actually able to deliver far higher revs than that:

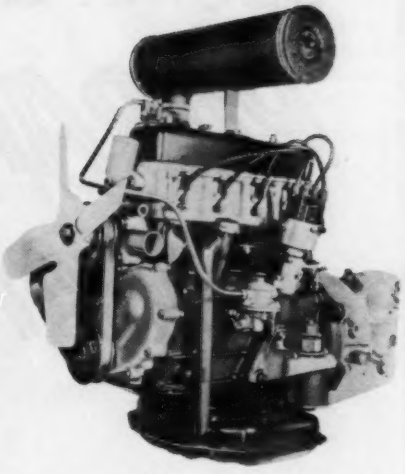
Gear	MPH	RPM	Piston Speed, FPM
I	21	4970	2440
II	40	6000	2946
III	65	6020	2956
IV	82	518	2543

We never did try to locate the 1300 engine's revving limit in actual driving. But twisting it as tight as we did, we found no clatter in the valve gear—which, on one occasion, followed the camshaft obediently out to about 6480 rpm—70 mph in Third. Like many other small, modern four-cylinder power plants, this one is notable for the nearly total lack of vibration that Detroit tells us is "what's wrong with fours." The smoothness doesn't derive from anything radical in the engine's design, but from its use of highly refined conventional principles. The 1300's stiff three-bearing crankshaft has short throws and large journals that overlap each other slightly. The crank is statically and dynamically balanced and a vibration damper is neither fitted nor missed—a good indication that all the reciprocating parts are balanced within very close limits.

Automatic choke and spark advance helped our test car's engine to fire up instantly from cold, and we had no hot-start troubles even in desert heat. The engine never detonated on regular fuel, and it consumed one quart of oil in 1900 miles; the steel-reinforced pistons have four rings.

The Aronde is built for stamina, and proof that it has this is its collection of 38 FIA international records, the longest of them for 100,000 kilometers or 62,138 miles at an average of 64.7 mph. The qualities of the car that impressed Sport Cars Illustrated's test staff even more, though, are its ride and its roadholding and handling qualities. Again,

Leaving test curve, Aronde seems to drift through broken white line; however, turn was taken wide.



The Simca 9 Aronde power plant has over square bore and stroke, and normal 7.2:1 compression.

Here test car buzzes along at better than 60 mph on leg of cross country run. Driver fatigue was negligible on road.

these results from no radical engineering but from the way well-tried principles have been applied in the design of the chassis.

For a car of its dimensions, the Aronde's suspension is massive. The rear semi-elliptic springs, for example, are 42 inches long in the main leaf, have eight leaves each, plus two 5/16 inch overload leaves. And each spring has a 1¾ inch double-acting tubular shock absorber. This sounds like truck practice, but the way it's applied in the Simca you get a ride that is soft, but doesn't pitch or roll, and irons out bad irregularities with stern authority. The ride stays the same over the car's entire speed range. It tracks well at top speed, entirely without wander or high-speed shake.

The Aronde chassis has been in production since the middle of 1951. Since that time the company has carried on a steady de-bugging operation, and such original defects as pronounced oversteer and body roll have been eliminated from the present-day Aronde. Fore and aft weight distribution is precisely at the ideal 50-50 point. Understeering tendencies are barely perceptible, and occupants of the car sense no body roll even at cornering speeds that no family sedan has any right to indulge in. The Aronde corners like a first-rate sports-touring car, and it does it so calmly and naturally—so entirely without screaming-tire, leaning-body pyrotechnics, that you often don't realize until you look at the speedometer that you're taking a familiar curve 10 or 15 mph faster than you'd want to in the average family sedan.

The Aronde's steering is light but of the sure kind that makes it a snap to dodge pebbles in the road at high speed. Because of its well balanced handling qualities it can employ an immense steering lock that gives it a small turning circle and outstanding maneuverability. By family-conveyance standards, its brakes are very good. During our ten-step brake performance and fade test only about one inch of pedal travel was lost, fade was moderate and gradual, and there was no tendency toward uneven brake operation.

Our unit-construction test car weighed just 2100 pounds with a full fuel tank. Aluminum is used lavishly throughout the machine — in the cylinder head, tranmission and bell housing, various chassis parts, body hardware, external trim, and wheel covers — but the body panels are made of heavy-gauge sheet metal. This and undercoating give the car a solid, well-built feel in spite of its light weight.

(Continued on page 65)

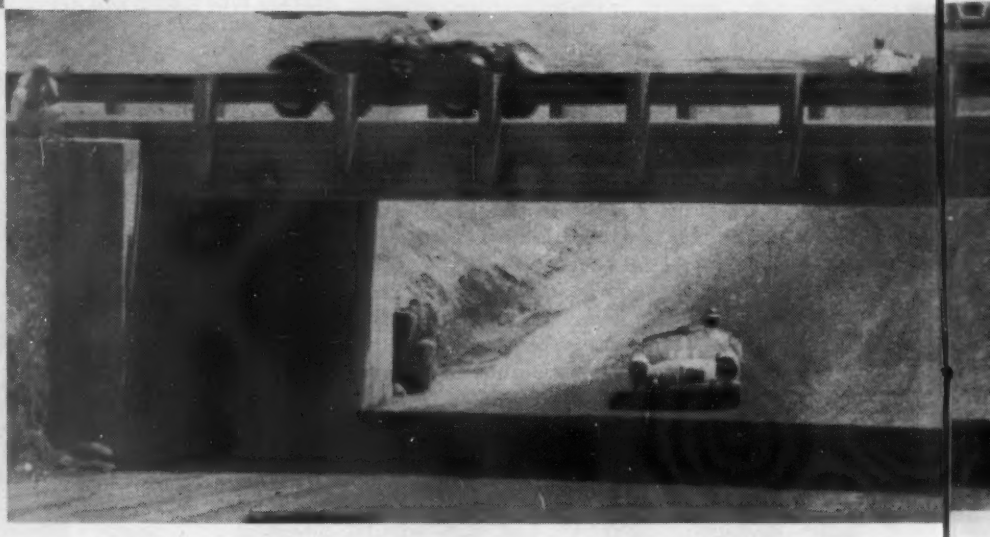
Front running detail. Anti-roll torsion bar is ¾ inch in diameter. Note massiveness of wishbones for such a light car.

Deep upholstery gives excellent, firm support to back and thighs. Note lowness of floor tunnel, and integrated shift lever.

opener at PARAMOUNT RANCH

BY JIM MOURNING

Sure that someone had mislaid turn five, Frank Nichols tries to part hay in search for it.



Coming under bridge is Mel Curland in MGA—no oil pressure—no finish. The drop out of turn 3 is so abrupt, faster cars left ground with all fours.

Photographs by Bob Rolofson

WHILE asserted sponsors and would-be sponsors of dream tracks from San Francisco to San Diego restricted themselves to conversation, were bogged down in delays or became entangled in red tape, a group of Los Angeles business men completed plans for a permanent road racing site with all the fanfare usually reserved for a nefarious cloak and dagger operation.

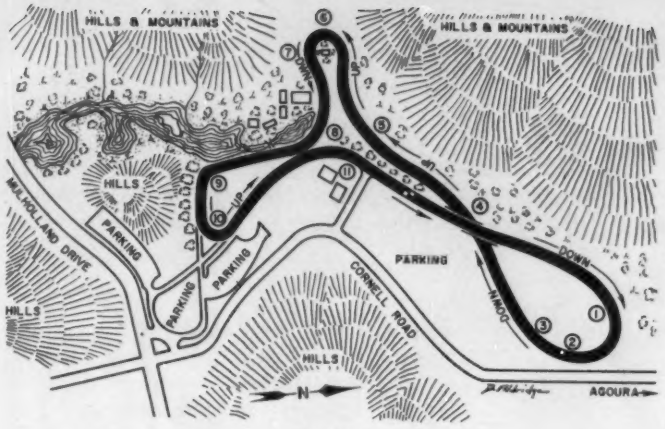
And not without reason. Like the boy who shouted wolf once too often, local promoters had hardened the public to claims of and for new road racing circuits. Consequently, when the California Sports Car Club announced they would hold a race on a new track just outside Los Angeles, a large segment of the local press raised a cynical eyebrow, noted that not an inch of asphalt had been laid and promptly went back to tossing harpoons at whatever was irritating them most at the moment.

But this reaction had been expected. Just 27 days later, contractors had turned a grassy field in the hills above Agoura, California into a road racing circuit. Site was the Paramount Ranch, whose western town set has seen many a celluloid cowboy in the past.

When the new circuit made its debut, several past and present holders of FIA paper were on hand, as were many who are familiar with the European scene. The general consensus was that the Paramount track is the equal of any club circuit in Europe and is most directly comparable to Brands Hatch in England.

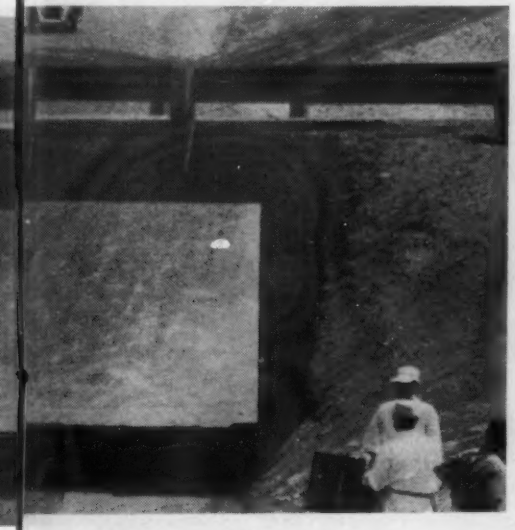
But whatever the circuit is, it is not a thing to inspire unrestrained joy in the hearts of drivers of big-bore machinery. Most of the corners are sharp enough to discourage heavier handling vehicles and a wide assortment of unpleasant places are available to those who don't quite make it around them.

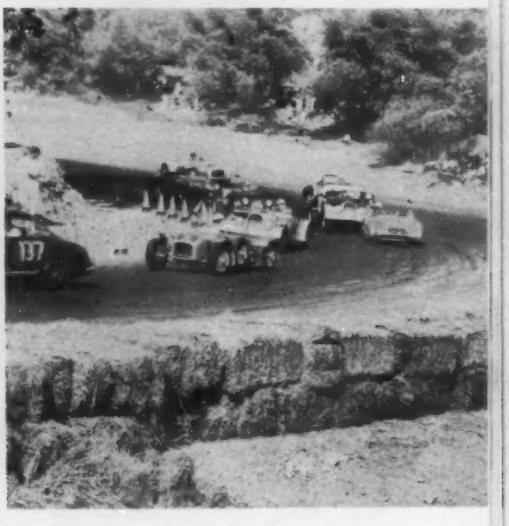
Roughly speaking, the layout resembles a well used figure 8, its outstanding feature being an overpass-underpass arrangement where the track intersects. It is approximately 2 miles long and has a 300 front straight, which strictly speaking, is the only straight on the course. And there isn't a single really level stretch to be found; the elevation variance being 35 feet between the highest and the lowest points, while the course widths ranges from 34 feet on the straightaway to 55-65 feet on the 11 turns, all of which are banked to varying degrees. From their vantage points on surrounding hills, spectators can see up to 90 percent of the circuit.



Map of Paramount Ranch shows it to be basically a misshapen 8 winding into some tight hairpin turns in its Southern end. Road needs no chicanes.

LOWER LEFT: Leroy Wise roughs up a hay bale with his DKW to make it behave. LOWER RIGHT: A mixed group of mounts find their way around turn five.





Although the course, as a whole, is undoubtedly the trickiest and most challenging yet offered to West Coast pilots, experience proved that the two toughest turns were number 5 — a sharp climbing right at the end of a relatively short but rapid straight, and number 8 — a sweeping right around the end of a barn and alongside a small lake.

Even though no one really doubted the sincerity of club officials when they carefully detailed the dangers of the new circuit, two sports cars rolled down the embankment into the lake and a Formula III car made an exciting if not graceful trip into the gulley on the outside of turn five — spelling it out in capitals for all concerned. None of the drivers were injured seriously enough to require hospitalization.

Despite a field composed almost exclusively of local talent, the inaugural event, which was restricted to senior drivers, provided much of the interest for the 20,000 spectators — mostly in the form of individual performances and a vigorous if not enlightening hassle over use of the black flag.

If one man could be said to have dominated the weekend, that man was 26 year-old Richie Ginther, in the Competition Motors Porsche Spyder. Ironically, with Ken Miles arriving too late from his record-breaking tour of Bonneville to enter, Jack McAfee fresh from his successful assault on eastern circuits, was all but handed top honors in the small-bore class before the car even left the starting grid. Ginther was mentally assigned the task of following the tail lights on the John Edgar owned-Porsche Spyder, driven by McAfee, as he has with Miles' Spyder during the past season.

But on Saturday, Ginther got out in front and managed to keep his tailpipes just out of McAfee's reach for the entire ten laps, finishing a half-second ahead. On Sunday, the throttle linkage on McAfee's mount snapped and Ginther breezed to a 57 second win over Frank Monise in a Lotus Climax. To make his weekend complete, Ginther returned in the big car battle and grabbed third overall.

Dr. William Eschrich's Porsche-Lotus, John McLaughlin in a Lotus Climax and Dr. Troy McHenry's Porsche Spyder followed in that order in Sunday's hour-long go for under 1500 cc cars.

(Continued on page 66)

SCI Technical Report:

Low, wide and handsome is this frontal view of the Veloce. Body and chassis of the Veloce is practically identical to the Giulietta. Bumpers have been removed to cut down turbulence for SCI test runs.

The Alfa Romeo Veloce Spyder

BY RUSS KELLY

ONE of the biggest surprises of the automotive year was the slow realization that Alfa Romeo, of Milano, Italy was making, for them, a mass invasion of the American light car market. The semi-mass production of a car aimed at a foreign sales program is really new for Alfa and is sure to prove enlightening to both the Italian manufacturer and the American consumer.

The natural decision of Alfa to publicize this new product —the 1290 cc Giulietta, on the race course has caused a couple of super hot models to put in their appearance at U. S. races. One in the gentle hands of Carroll Shelby ran away with the under 1500 cc race at Cumberland, Maryland. On the west coast Bill Pollack proved that he could deal out rations of fits to all but the most experienced Porsche Spyder drivers at Santa Maria, California.

Called *Veloce*—the fast—this little bomb has the advantage of being able to run in production car races. It's significant, however, that the technical committee of the Southern California Region of the SCCA was a little difficult to convince about its eligibility as a production model when Pollack raced it at Santa Maria. The fact that the only two real Veloce Spyders imported are still apparently under factory control and not really available for testing leaves a couple of interesting questions unanswered.

First, it seems they have difficulty in finishing a race with any binders left to speak of. Second is the question raised by the laconic statement of an English mechanic on their handling after witnessing the '56 Mille Miglia. Simple and to the point he said, "They 'ad 27 of 'em 'anging about in the trees between Brescia and Rome."

Conjecture aside, this model is doing an excellent selling job because of its agility, phenomenal speed and accelera-

tion. You can be sure that every small specials builder in the U. S. has got his eye on the little Giulietta two-cam mill since its potential has been so well demonstrated by the Veloce.

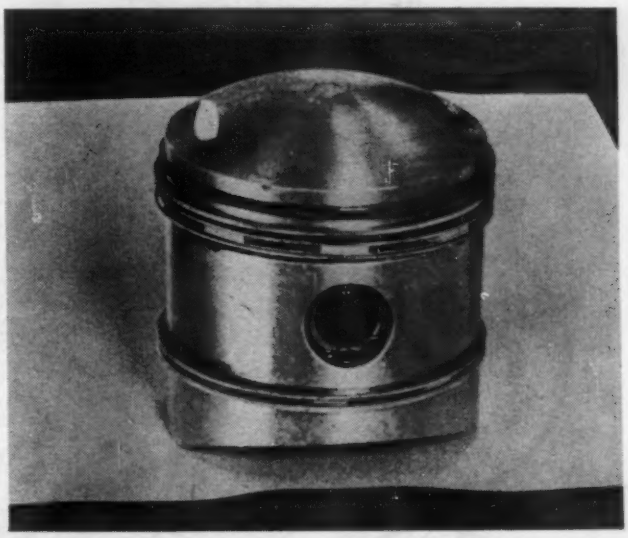
In the same category as the question "Which came first, the chicken or the egg," you can put the question that comes to mind when you review the history of Alfa. Are they the world's best at hot rodding production models and turning them into racing cars or the world's best at detuning racing cars and turning them into production models? The relationship between the Giulietta and the Veloce does nothing to answer this question. Under superficial examination—standing still—you'd have a hard time telling them apart, but you'd have a tougher time turning a Giulietta into a Veloce.

The body and chassis are practically the same, the principal difference being that the Veloce uses aluminum for hood, doors and deck lid. The chassis-body integral construction precludes the more extensive use of light alloys. The chassis is of the platform type which consists of a pressed steel floor that is reinforced along each edge. Forward of the firewall there is a system of channeled sections that carry the engine and gearbox unit and the front suspension layout. This system follows in general the shape of a sloping shallow box with an upper and lower member on each side. The lower members are tied together by a simple cross member and forward of this is a channel section diaphragm that ties all four members together. To this is welded the body shell, consisting of the front fenders, cowl, firewall bulkhead, rear turtle deck and rear fenders.

Integral construction offers a great deal of rigidity in torsion, but may suffer in beam stiffness. Remembering that a beam's resistance to bending varies as to the cube of its depth, the lack of a steel top to take compression loads and the deep cutaways for the doors has effectively reduced the depth of the beam. However, this body is well reinforced around the opening in an effort to compensate for any loss of strength. The disadvantage of this type of structure in a racing car is that even a minor collision could cause damage extremely difficult to repair.

(Continued on page 36)

Driver can watch his instruments through wheel rings without difficulty. Left-hand gauge cluster includes water temp., fuel and oil temp; center gauge is tach calibrated to 8000 rpm and incorporates oil pressure gauge; dial at right is speedometer marked in mph.



This is the Giulietta piston which exerts a compression of 8:1. Pistons in the Veloce do not have fourth ring around the skirt, but otherwise are the same. Veloce slug exerts about 9:1 compression.

Veloce takes hard turn at better than 70 mph. Although car feels flat through curve, it does lean.

ALFA ROMEO SPRINT VELOCE

SPECIFICATIONS

POWER UNIT:

Type	In-line four.
Valve arrangement	Double overhead camshaft.
Bore & Stroke (Engl. & Met.)	74 by 75 mm
Displacement (Engl. & Met.)	78.6 cu. ins; 1290 cc.
Compression Ratio	8.5 to 1.
Carburetion by	Two Weber double choke side draught—Tipo 40DCO3.
Max. bhp @ rpm	90 at 6500; factory figures (might be conservative).
Idle Speed	2000 rpm (car never runs under this speed).

DRIVE TRAIN:

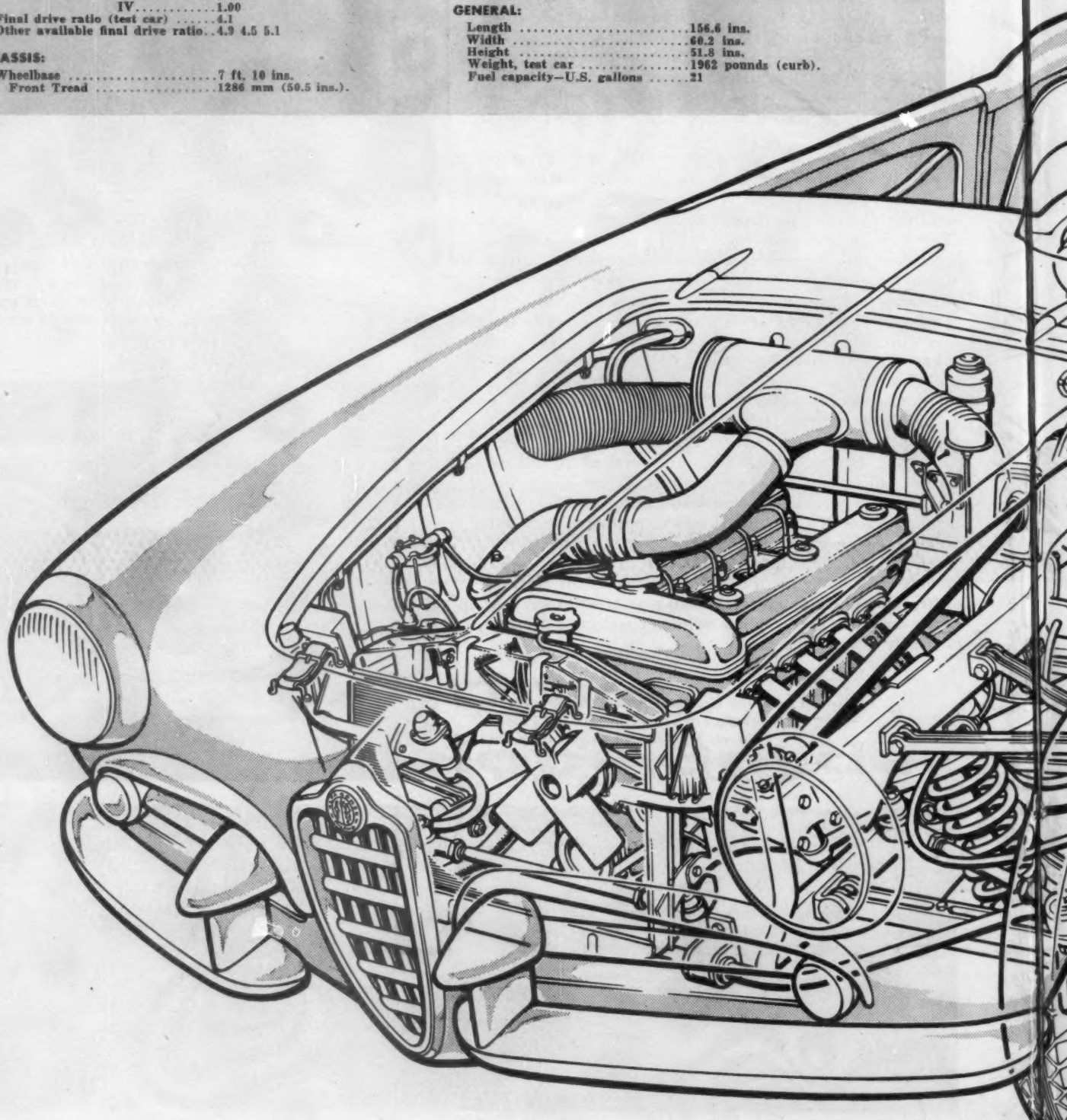
Transmission ratios I	3.59
II	2.10
III	1.36
IV	1.00
Final drive ratio (test car)	4.1
Other available final drive ratio	4.9 4.5 5.1

CHASSIS:

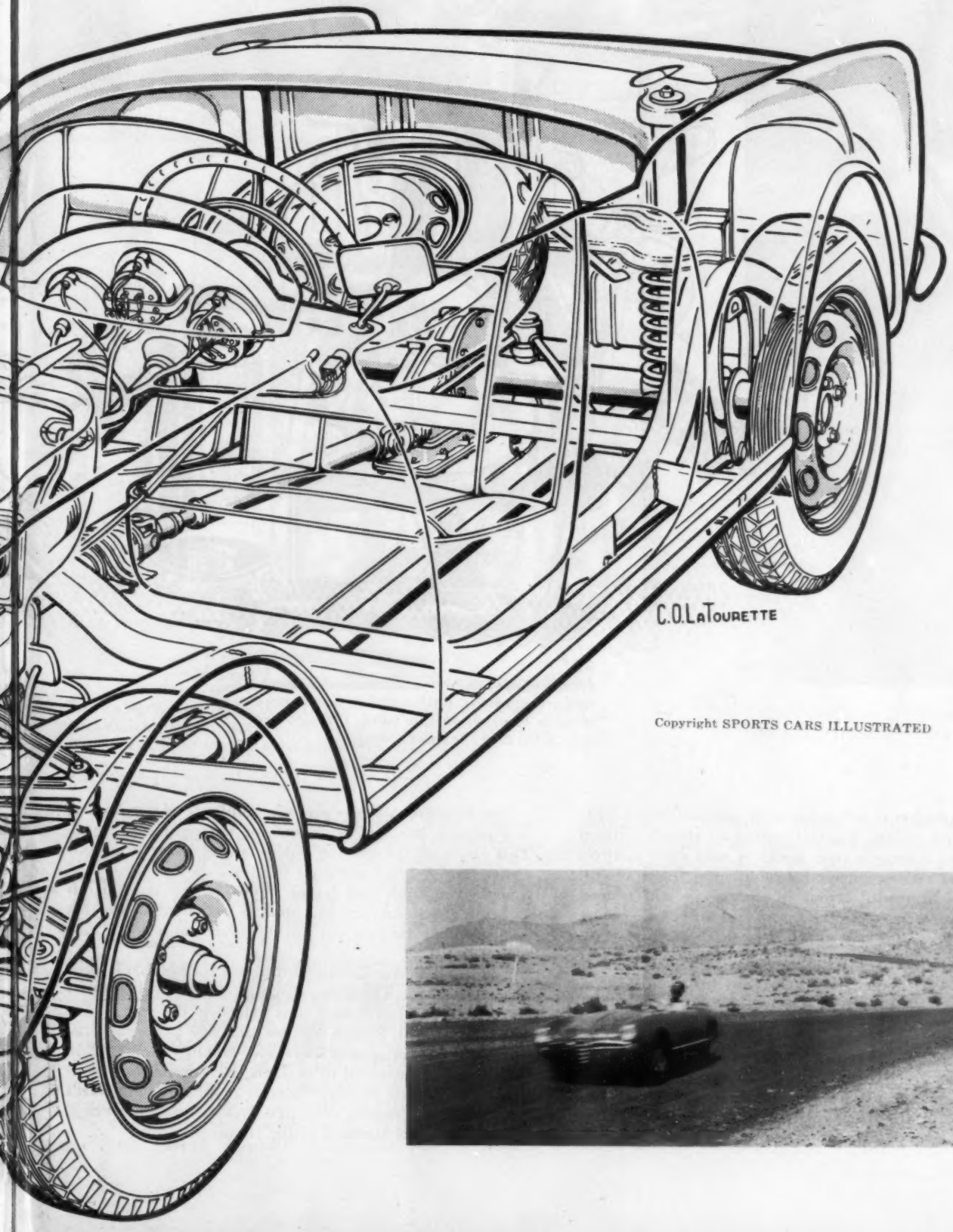
Wheelbase	7 ft. 10 ins.
Front Tread	1286 mm (50.5 ins.).
Rear Tread	1270 mm (49.9 ins.).
Suspension, front	Independent by wishbones and coil springs.
Suspension, rear	Solid axle; coil springs located by "A" frame offset to left.
Shock absorbers	Telescopic.
Steering type	Worm and finger ZF box.
Steering wheel turns L to L	2½
Turning diameter	215.6 ins.
Brake type	Four wheel hydraulic—front drums heavily ribbed—front: two leading shoes.
Brake lining area	264 sq. ins.
Wheel studs, circle diam.	(four studs).
Tire size	5.50x15 Pirelli-Cinturato.

GENERAL:

Length	156.6 ins.
Width	60.2 ins.
Height	51.8 ins.
Weight, test car	1962 pounds (curb).
Fuel capacity—U.S. gallons	21



ALFA ROMEO SPRINT VELOCE



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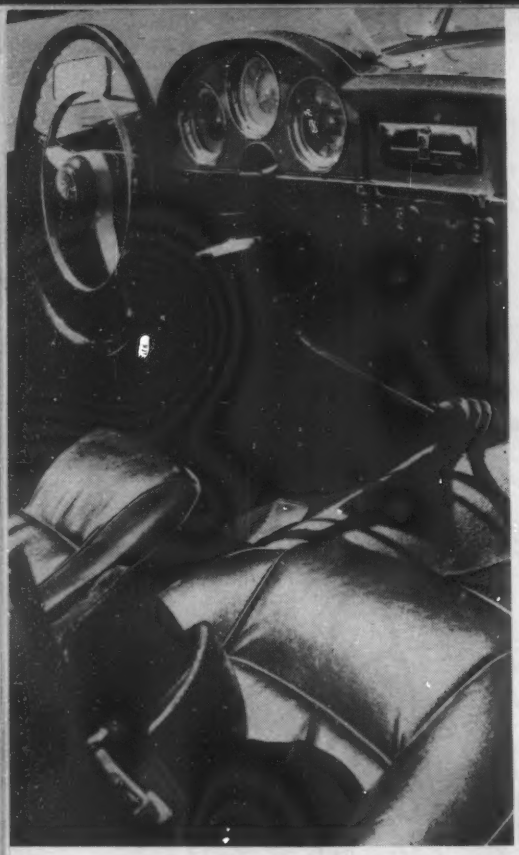
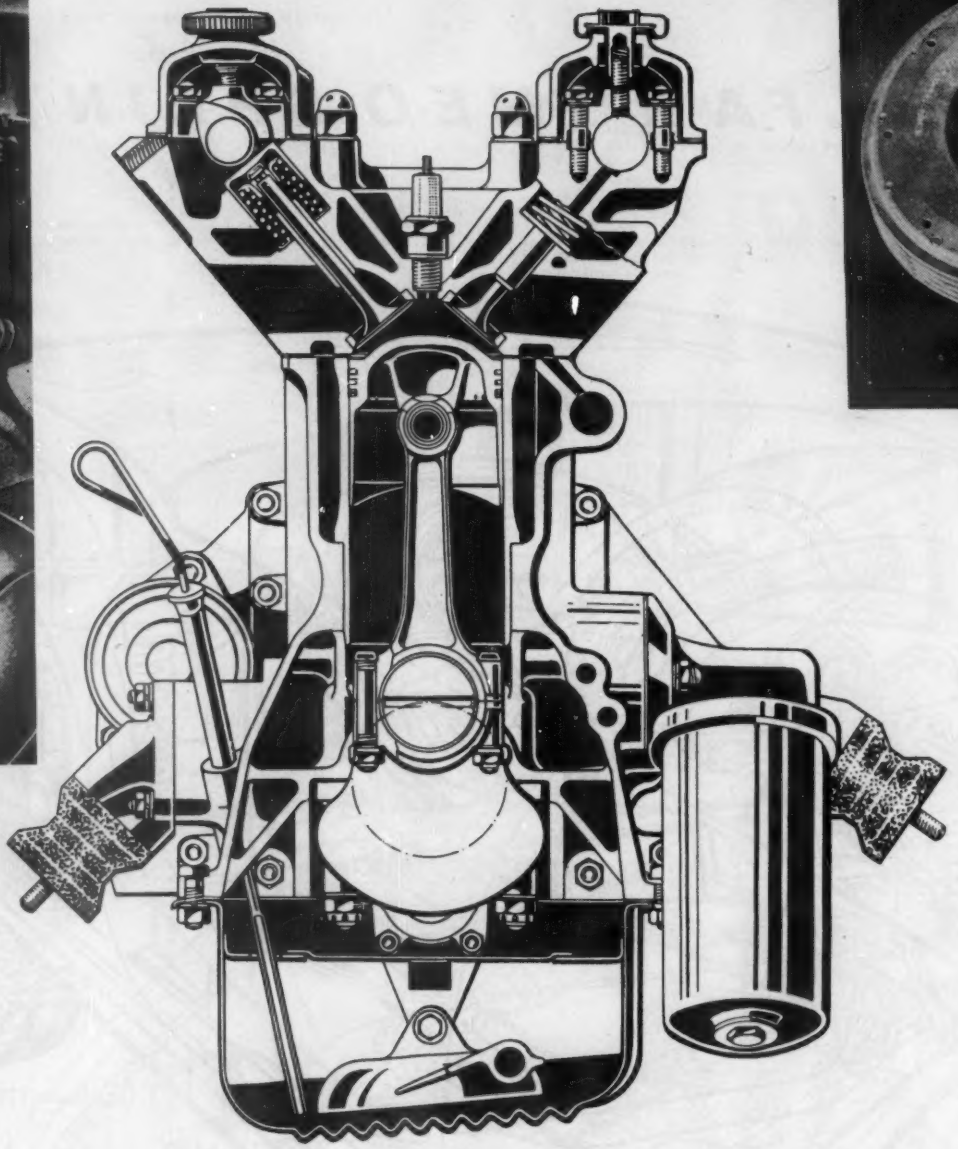


Cockpit is luxuriously appointed in leather. Note deep seats, and husky and graceful shaped gear lever for easy shifting.



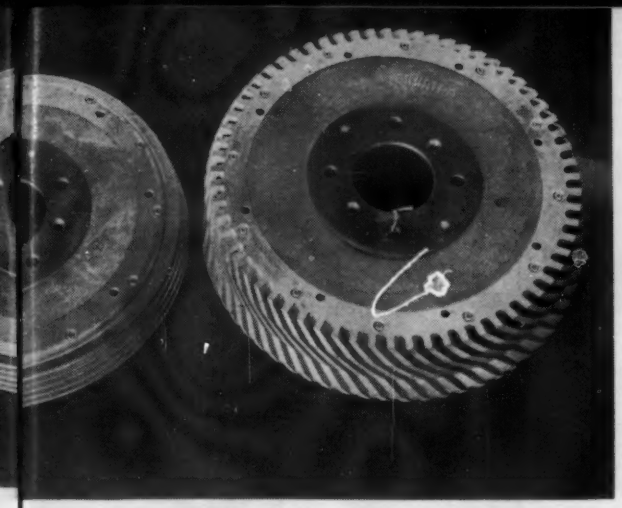
Front cutaway of engine shows double overhead cam arrangement. Both camshafts are carried in plain bearings-operate valves through steel cups fitted over the valve springs.

Front suspension is independent by unequal-length wishbones and coil springs. The coil springs are steeply inclined and surround telescopic type shocks. A steel cable controls rebound and rubber bumpers establish the limits of full bump. This front end layout is unusual in that instead of a kingpin carrier tying the upper and lower "A" frames together with a stub axle attached to this, Alfa practice is to incorporate this in one unit that is bushed and turns at the points where it is attached to the "A" frames.

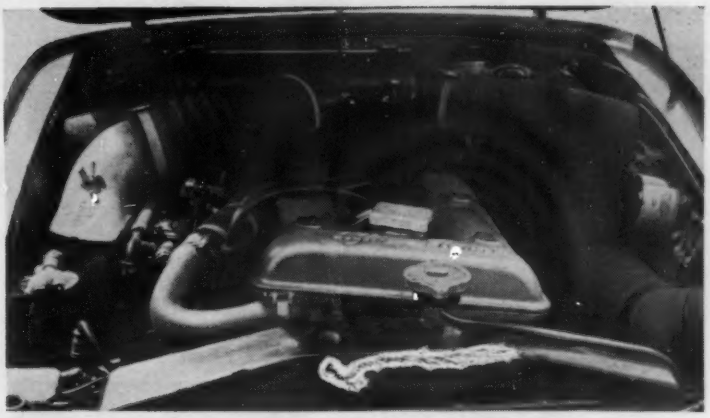
The steering box is of the familiar ZF worm and roller type. However, the steering linkage is quite different from the usual type. Attached at right angles to the vertical output shaft of the steering box is what amounts to a double-ended pitman arm. To the rear of this arm is attached the short track rod for the left, or driver's side, front wheel. Attached to the front end of this arm is a drag link that crosses the chassis slightly above and to the front of the axle center line.

The drag link actuates an exact duplicate of the steering box pitman arm and track rod for the right side wheel. This places all the steering linkage ahead of the front axle center line. A heavy stabilizer bar links the two lower "A" frames. The front end layout impresses you immediately as being clean and well executed. It isn't hard to see that Alfa has been turning out quality merchandise for a long time.

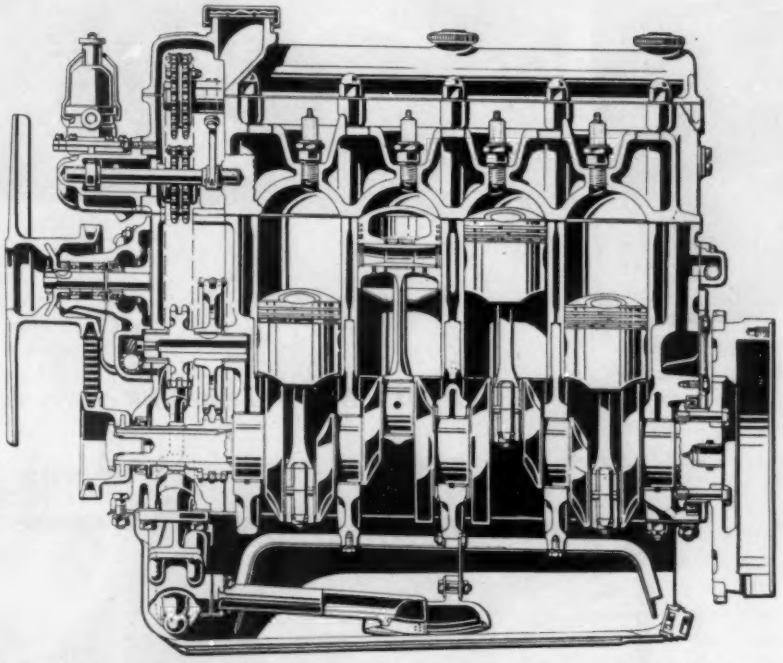
The live rear axle is suspended by coil springs that enclose telescopic shocks. The spring disposition is vertical and they are mounted in heavy steel cups welded to the rear section of the body shell. Radius rods on each side locate the final drive unit under acceleration and braking loads. These radius rods are attached to brackets that extend downward from the rear axle housing, forming in effect a half Watt's link. From the housing they pass forward on a horizontal plane to brackets attached to the chassis platform.



Front, rear brake drums. Rear is 10 inches inside, has ribbed exterior. Front drum, right, is finned.



Large diameter flexible hoses carry air to cockpit for ventilation and to air-filter before it's carried to balance box.



Side cutaway view shows internal works. The cast aluminum block is fitted with iron wet liners. Note crankcase and sump line is well below the center line of the five-main-bearing crankshaft.

Split headers join 2 common collector boxes and terminate in one pipe at rear.

The reaction to braking and acceleration loads inherent in this sort of layout is absorbed by a triangular tube frame attached by a ball joint at its apex to the driver's side of the differential housing and extending forward. Its effective length is about half that of the radius rods. This must be a busy little unit since it serves as torque reactor, stabilizer bar and panhard rod. The heavily ribbed differential housing is of cast aluminum and incorporates a small sump. The steel axle housings are bolted to this casting. Full bump and rebound is limited by straps and rubber bumpers.

The brakes that boast an impressive amount of lining area (264 square inches) are hydraulically operated. In the front, two leading shoes expand in a 10.5 inch drum that is of bimetal construction. The aluminum muff that is shrunk around the ferrous lining is liberally vaned to dissipate heat. The rear drums are .5 inches smaller in diameter than in the front. Also of bimetallic construction, they are ribbed peripherally. The usual practice for sports car brakes is followed by using one loading and one trailing shoe in the rear. The hand brake operates only on the rear wheels by a system of cables and levers.

The engine gearbox unit has three mounting points. It is not mounted vertically in the chassis but lays over slightly to the right. In addition to other modifications, this engine has been carefully assembled of selected components and is noticeably smoother than the production Giulietta. Extensive use of alloys makes this four cylinder twin camshaft engine extremely light.

The cast aluminum block is fitted with iron wet liners and is extremely deep. The joining line of crankcase and sump is well below the center line of the five main bearing crankshaft. The cam chain cover carries the cross shaft that drives the distributor and the gear type oil pump. Two stages of chain are used in the cam drive, thereby reducing

(Continued on page 62)

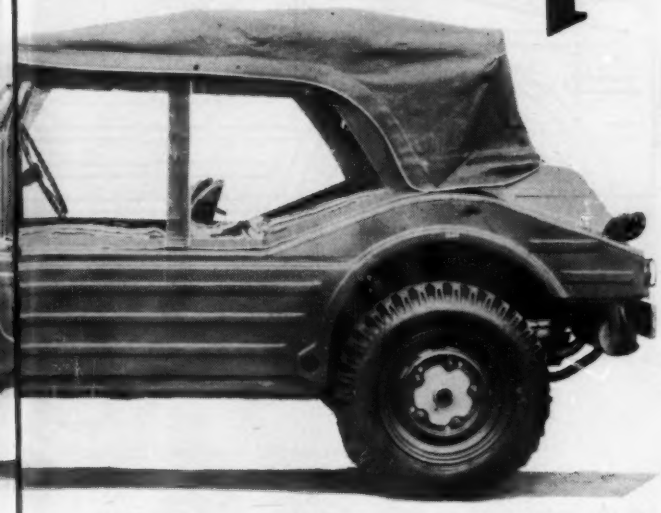
Porsche Builds

All four wheels spinning, the Jagdwagen charges up a mud and snow covered slope. Slants of 65% are possible.

By JESSE L. ALEXANDER

a Jeep

Und er schwimt. . .



ABOVE: New Porsche from profile view with top in place. Body metal is stamped for stiffness.
BELOW: Porsche jeep takes a swim to show its versatility.

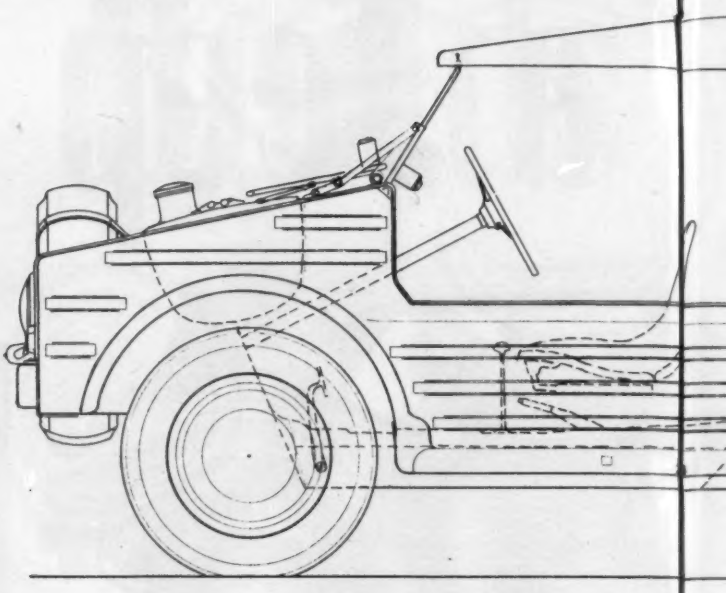
Well almost, but not quite—although the new Porsche "Jagdwagen" can't really propell itself fish-like across the Pacific, it will float like the proverbial cork when negotiating rivers and lakes, without the necessity of elaborate waterproofing. This is just one interesting feature of the new model which I checked out recently at the Porsche Stuttgart factory. But before going further into the details, it might be worth while to take a look at the car's historical background.

To pick up the train of events, it's necessary to go back ten or fifteen years to the second World War and note that among the late Professor Porsche's many inventions for the German army was a light jeep-type vehicle known as the Kubelwagen, or "bucket car". This Kubelwagen, the German equivalent to our jeep, was basically an open VW with a four wheel drive, and along with its sister, a four place amphibious vehicle, and made its reputation on the desert in North Africa, serving under Rommel. They proved to be rugged performers and even won praise from Field Marshall Montgomery who appreciated the value of the unbeatable air cooled engine running economically under all types of conditions. Even Volkswagen today base much of their advertising on the desert experiences during wartime with the VW prototypes. Naturally, at the end of the war, most of the amazing Kubelwagens fell into Allied hands, and transportation officers in the American and British armies were fascinated with the car's design, as they realized how complicated and inadequate were many of their own vehicles. In Germany today you can occasionally see a Kubelwagen on the road, second and third hand models bringing top prices on the used car markets.

So much for the Kubelwagen – by 1953, two German automotive companies were experimenting with newer and lighter four wheel drive vehicles designed especially for the German military forces and NATO. Both DKW (Auto Union) and Goliath (Borgward) announced Jeep prototypes. The Porsche company had been up to that point completely busy with the 356 sports car, and riding the crest of success, suddenly became interested in building a jeep of their own, for they realized that they already had the basis for such a car in the old professor's Kubelwagen. Not wanting to miss out on new markets, Ferry Porsche assigned several teams of engineers to the project of building a newer and better bucket wagon. In a short time the rows of silver Spyder racing sports cars in the experimental department were told to move over as the new olive drab types began to take shape.

In designing the car, the following factors were laid down as all important: 1) speed and maneuverability, 2) low weight 3) greatest possible useful load 4) cross country driving ability 5) safety in operation 6) simple maintenance. Thus early in 1955, the new "Jagdwagen" was announced in prototype form, and several units were distributed throughout the world's military services for evaluation. In the middle East, in Northern Sweden, often hauling 1100 pound trailers and four fully equipped men, the car took every test in its stride, experiencing only minor material failures that would have shown up only through

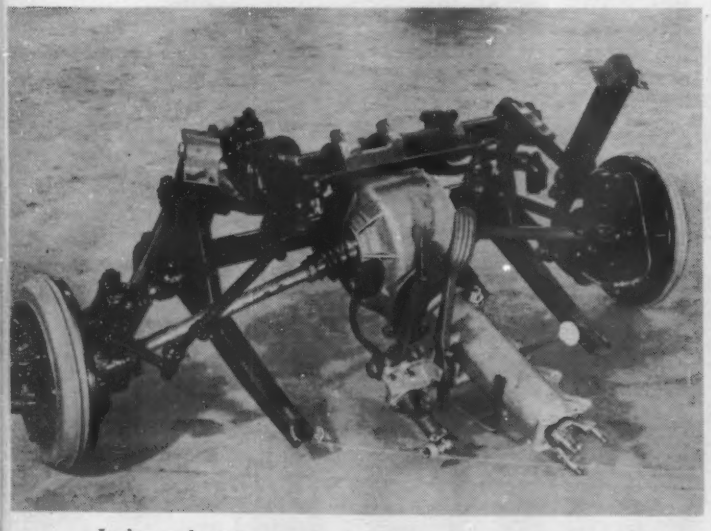
With all four wheels off the ground, the Porsche Jeep takes a rough hurdle without injury.



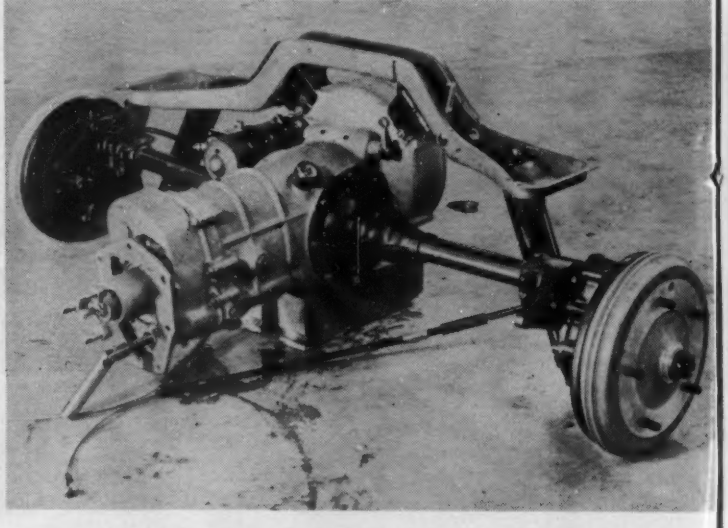
exhaustive road testing. The Porsche engine, fitted with a heavy duty oil bath air filter as standard equipment, operated perfectly despite sand storms, heat, and every conceivable kind of weather. The "Jagdwagen" even went through flotation tests in the Mediterranean. For one especially rugged trial in Egypt that covered a distance of 6232 miles, fuel consumption averaged out to 18.5 miles per gallon, many of these miles being covered in low-low, all wheel drive. The limited slip differential proved its worth in sand. The British received several of the new prototypes for test purposes and as yet the complete results have not been made public, except for the simple statement that they were "fully satisfactory."

Surprisingly enough, despite all the glowing comments about the car, the "Jagdwagen" is not yet in production, and probably won't be for another month or two. This is due for the most part to political goings on at the legislative level in the Bonn Government, though 12 vehicles have been delivered to the cadre of the new German army as the forerunner of a larger shipment when Bonn finally assigns the contract. Military forces and especially the NATO organization realize the "Jagdwagen's" value, its virtue lying in its simplicity and low fuel consumption (24 miles per gallon). The Porsche's chief competitor is the DKW jeep, but even though it is undoubtedly a very rugged unit, the two stroke engine and the problems inherent in its design will be a mark against it. Military supply officers always seek to standardize fuel requirements and more important, a soldier in combat will not be happy about mixing the proper ration of fuel and oil for his two stroke jeep. For this one reason I think the Porsche will get the nod.

(Continued on page 55)



Independent front wheel drive suspension unit and forward gear box. Lever with white knob is front wheel drive control. Note high placement of steering box.



Rear drive shows typical Porsche transmission, shock absorbers, starter motor, and rubber stops to cushion upward motion of rear axles.

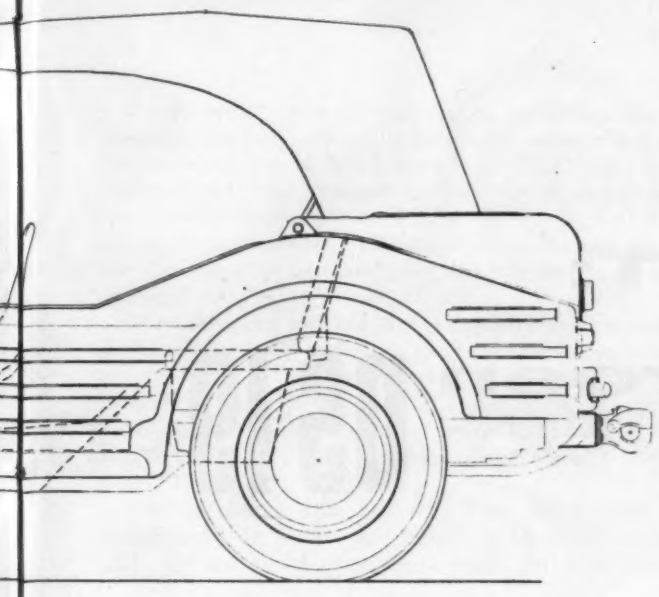


Diagram shows seating layout, fuel tank, pedals and shift lever.

As all Porsches, the jeep embodies rear engine design. Note large protective air-filter.

SPECIFICATIONS PORSCHE TYPE 597

Jagdwagen — The Hunter

DIMENSIONS:

Wheelbase	81 inches
Track front	52.6 inches
Track rear	54.6 inches
Length overall	142.5 inches
Width overall	62.9 inches
Height overall (without folding top, but with raised windshield)	57.4 inches
Empty weight	2182.5 pounds
Useful load	approximately 1100 pounds
Permissible total weight	3284 pounds
Axle loads (fully loaded vehicle)	
Front	1388 pounds
Rear	1895 pounds
Ground clearance	9.8 inches
Turning circle	40.4 inches

DIFFERENTIAL: limited slip type

TRANSMISSION: 5 speed, 4 fully synchronized forward gears—1 low-low.
Reduction gears at rear wheels.
Power to front axle supplied by drive shaft and is connected by claw-type clutch.

ENGINE:

Cylinders	4. air cooled, opposed. 1586 cc.
Horsepower	50 bhp at 4000 rpm
Compression ratio	6.5:1
Carburetor	single downdraft

SPEEDS IN GEARS:

Cross-country gear	11.1 mph
1st	16 mph
2nd	29 mph
3rd	45 mph
4th	60 mph
Reverse	13 mph

GEAR RATIOS:

Cross-country gear	29.3
1st	20.6
2nd	11.0
3rd	7.0
4th	5.2
Reverse	24.9
Fuel tank capacity	10 gallons (reserve 5.2 liters)
Normal cruising range	365 miles
Oil in crankcase	3.5 liters
Oil in gearbox and rear differential	4 liters
Oil in front differential	2.5 liters
Oil in one rear wheel reduction gear	.25 liters

MAXIMUM TORQUE: 10.2 mkg at 2300 rpm (approximately 72.3 lbs/ft.)

Tires	600 x 16
Hydraulic four wheel brakes	mechanical hand brake, on rear wheels
Maximum grade negotiable under full load	approximately 65%
Factory figures regarding fuel consumption	24 miles per gallon (normal driving)

SCI

ROAD TEST: The Citroen DS 19

Road clearance of the DS 19 adjusts from within driver's compartment. Here car sits at 13 inches.

From thirteen inches above the road, car is lowered to normal driving stance.

With the spare wheel conveniently carried in the front, and the fuel tank rectangular in shape and pushed well forward, the trunk space becomes unusually deep.

THE mere explosion of a bomb would have caused far less excitement at the late 1955 Paris Automobile Show than the introduction of an entirely new two liter Citroën with hydro-pneumatic independent suspension front and back, plus brakes, steering, clutch and gearshift operating on the same hydraulic system. Motorists actually fought to get their names given delivery priority and today, the new Citroën DS 19 is virtually a black-market item with used cars bringing more than the new price of 930,000 francs.

Now to attempt an analysis of one of the most complex creations ever to be offered the motorist—at a very reasonable $3,285 delivered in New York, anywhere in the U. S., or France.

The very efficiently streamlined four-door body is monoshell on a box beam frame. It has light gauge steel door panels and fenders, aluminum hood and trunk lid, and a plastic top supplied already painted or transparent. The car's suspension is hydro-pneumatic with a self-leveling load device front and rear, operating in any one of three car body height positions. Front and rear brake pressures are equalized according to load on rear axles—giving an entirely new concept in brake efficiency, and front brakes are inboard

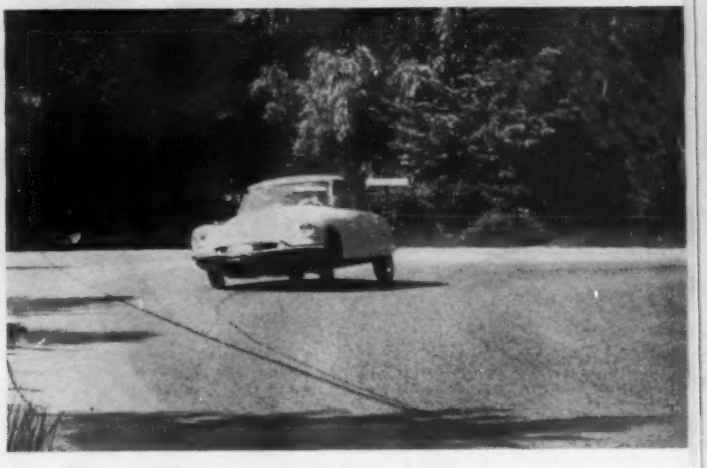
disc type with "automatic" take-up on the friction material, opposed-clamps type shoes in each unit. Rear brakes are of the outboard, conventional drum type. The 75 hp engine is conventional, four cylinders in-line, having two coils and two contact breakers instead of a distributor, and a twin-throat Weber carburetor which rations gas intake by keeping the secondary throat closed until the primary throat is fully opened.

The four-speed forward shift is basically conventional, but its operation is by hydraulic means and features clutchless control through a lever extending from the dash panel directly in front of the steering wheel. Steering is the full-time power type—having three turns lock to lock, and a single spoke, 15½ inch diameter wheel. Drive is—need we say?—FW.

The car has a 123 inch wheelbase, front track of 59 inches, rear—51 inches, and weighs 2,475 pounds with one gallon of gas, tool-kit and spare wheel. All this just about

Allen type nut holds driving wheels on hexagonal drive-key. Remove with a specially supplied wrench.

By exhausting the hydraulic fluid from suspension cylinders, Citroën is placed just 3 inches above road.



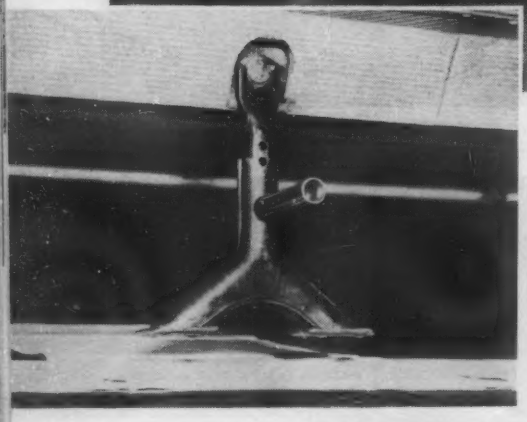
The Citroën seemingly distorts itself in a sharp bend. Only excessive force broke tires from pavement.

sums up the car until we briefly outline the car's very *different* handling and performance. With the dash-located switch key turned to the right, the engine fires smoothly after a few seconds' coaxing with the shift lever moved from neutral to far left to engage starting motor. Returning the shift lever to neutral, it is then pushed dead ahead (to within a half inch from the horizontal line speedometer face) for low gear selection. Here, Citroën recommends that the car be held at standstill by placing the right foot lightly on the 1½ inch diameter, 1½ inch high, main brake "button". Upon brake release, the car will move slowly and smoothly away. Then the gas treadle is employed for normal pickup. If a faster take-off is desired, omitting the brake and footing the gas treadle instantly upon gear selection will obtain it. But, unless the driver feeds gas very smoothly, a short, wheelspinning surge will disturb everyone concerned, and perhaps induce a series of take-off bucks.

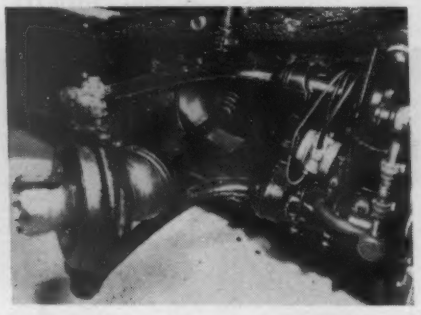
Once rolling, second gear is selected by pulling the shift lever directly back, through neutral, towards the steering wheel. If the gas foot is not slightly backed off upon moving the lever, the engine will rev up anywhere from slightly to fiercely—depending on the urge applied, and second gear engagement will be another surge ahead. Third and fourth gears are found by moving the lever to right center, then to full right. The cross-dash engagement positions are nicely marked—"2-3-4"— and can be distinctly "felt" upon entering or leaving. Reverse is found by moving the lever ahead to low gear position, then full right. Here, much gas foot care must be taken to avoid a sudden backwards jump.

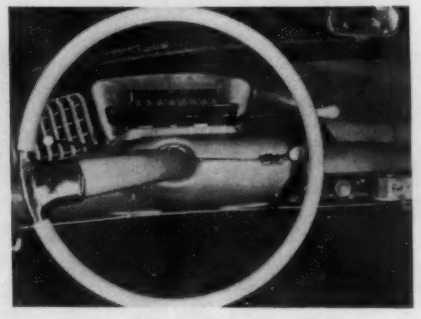
The engagement of gears can be hurried by backing completely off the gas, then tromping down hard. Otherwise, a wait of anywhere from one to three or more seconds is encountered, depending on the adjustment of the entire shift unit's timing. Three of the four cars tested were found to have at least a two second lag with one suffering a full five seconds before making up its mind to engage. This car could, however, be made to shift as quickly as those in "good" order by the quick, hard gas tromp technique . . . at the inconvenience of a jump ahead.

Shift down can be done very nicely by revving the engine a bit as the lever is moved to the left. But, if the driver moves the lever to the left without applying gas, he may wait for anything up to a minute before downshift engagement occurs. This seems to be part of the car's over-all safety



ABOVE: Car is raised fore and aft by placing jack in center slot. BELOW: Jack in slot before lowering body.





LEFT: Front suspension and drive of the Citroën. Articulating arms are set well back of drive shafts in roller mounts. RIGHT: One-spoked wheel & dash panel.

design, as sudden engagement of a front wheel drive to full engine brake can cause front wheels to lose traction—a very unpleasant occurance under certain cornering conditions.

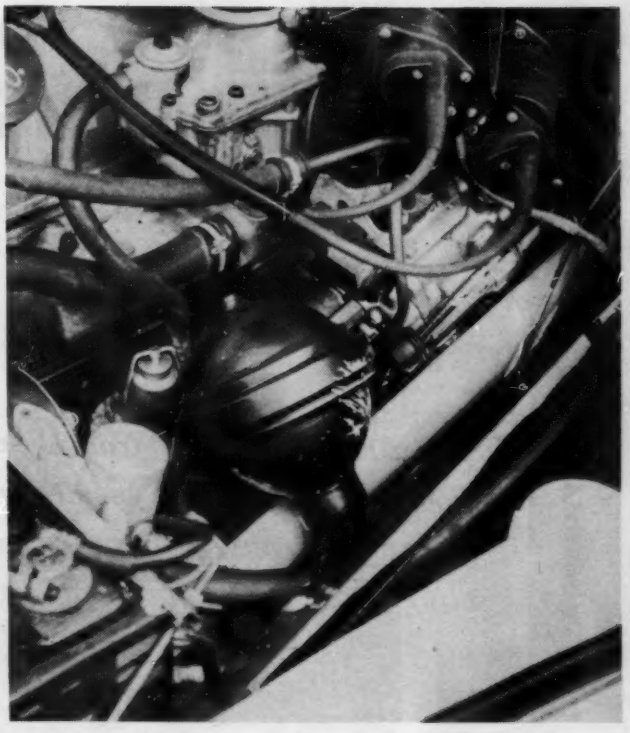
Right here, it becomes apparent that the new Citroëns require a very individual gear change technique. It's not difficult to learn and can be most enjoyable, once mastered. The advantages of a well-ratioed, four-speed box requiring no clutching become very evident upon fast touring through busy terrain.

Steering sensations are completely individual, as the response is about as fast as, say the Mercedes 300 SL, and the full time power system is devoid of any lag or soft feeling. More unusual, the system is such that a straight line will be "held" by the car during hands-off periods—even though slight bumps are encountered. However, the control is not dead in the usual power steering sense due to the unit's remarkable quickness. The over-all effect is one of great safety, for drivers relatively unfamiliar with sports-car fast steering can direct the car without the usual human overcontrol awkwardness. There is a direct hookup to the pinion should the power unit fail to operate and steering may be continued instantly by manual control, although a test of this feature showed considerable heaviness of feel at lower speeds.

Suspension characteristics are certainly the most outstanding encountered. The complete damping out of high frequency wheel movement, instantaneous yet graduated checking of rebound, and the system's ability to rapidly compensate car height to varying axle loads, all combine to make a riding comfort and safety that must be experienced to be comprehended. The car may be literally hurled through rough downhill corners by unskilled hands and remain comfortably safe. Attempts to make the back wheels break away were unsuccessful in almost all instances during the fastest cross country tests. Once the rear does break, it does so evenly and regains traction faster than conventional IRS on cars such as the Mercedes 190 SL— if such performance can be estimated.

For those who have experienced front wheel drive car steering to date, the Citroën is superior to even the finest Millers in over-all ability to hold a set curve under severe braking by either engine or power brake. Even when the independent mechanical foot (parking) brake operating front wheels only, is applied sharply in a bend, the front wheels hold traction in remarkable fashion. It is possible to brutally force the car that the front wheels slide out in plowing manner, but few Citroën owners will ever find this point, even on wet roads. Should such a skid occur, it is unwise to attempt brakes, as sharply applied power will most efficiently aid recovery. There is a French legend that should a Citroën be accidentally driven off a mountain bend into thin air, the driver needs only sufficient power at front wheels to bring him safely back to the road. After five days of testing the DS 19, this tale does not appear too far-fetched.

The car may be raised from a highway running height with ground clearance of seven inches, to one of two rough terrain running heights permitting 11 inch or 13 inch clear-



Pneumatic sphere has rubber diaphragm separating fluid, lower half, from inert gas, upper half. Two valves in the unit control hydraulic pressure in damping fashion and act as shock absorbers.

ance. A five-inch hand lever, painted white, located left of the parking brake pedal, alongside the driver's lower leg, controls running heights, plus a full-down position allowing only three inch ground clearance. This lowest position is obtained by exhausting the hydraulic fluid from the suspension pistons, and is intended to be used in conjunction with the car's unique jacking system. (The car is power raised to full height, adjustable stand is secured to stud recessed in bodywork under front door, then car is "lowered" with the result that the "jacked" side stays up.)

The braking theory employed by Citroën removes this car from any category other than Grand Prix cars. And its superiority goes even further in that brake efficiency remains constant under all duty as there is no fade. Load on the rear axle governs brake force between front and rear wheels, and separate accumulators on separate piping actuate front and rear brakes independently; each unit being able to stop the car under any circumstances. The brakes are so powerful that full application will cause a front wheel (usually left) to lock and drag at speeds up to fifty-five mph. However, the foot pressure required to cause wheel lock is relatively high, and the most amazing short stops can be achieved without panic pressure on the brake button.

The important thing for the driver new to DS 19's is to practice "finding the brake button." It is not that the smallness of the control makes it difficult to locate, but that the height is somewhat lower than the gas pedal—and a full four inches below most standard brake pedals. "Pawing the air"

(Continued on page 56)

CITROEN DS 19

PERFORMANCE

TEST CONDITIONS:

Number aboard	two
Top position	sedan
Temperature	70° at sea level.

TOP SPEED:

Two-way average	90 mph.
Fastest one-way run	94 mph.

ACCELERATION:

From zero to	Seconds
30 mph	5
40 mph	8.5
50 mph	12.7
60 mph	16.2
70 mph	25.9
80 mph	34
90 mph	52
Standing ¼ mile	21
Speed at end of quarter	67 mph.

SPEED RANGES IN GEARS:

I	0 to 25 mph
II	6 to 52 mph
III	12 to 75 mph
IV	18 to 90 mph

SPEEDOMETER CORRECTION:

Indicated	Actual
30	30
40	41
50	50
60	61
70	71
80	80
90	89

FUEL CONSUMPTION:

Average driving (under 60 mph) . . 28

BRAKING EFFICIENCY:

(10 successive emergency stops from 60 mph, just short of locking wheels): no fade.

SPECIFICATIONS

POWER UNIT:

Type	In-line four; water cooled.
Valve Arrangement	60° OHV hemispherical.
Bore & Stroke (Engl. & Met.)	3.07 x 3.94 ins.; 78 x 100 cm.
Bore/Stroke Ratio	.78 to 1
Displacement (Engl. & Met.)	116.5 cu. ins.; 1911 cc.
Compression Ratio	7.5 to 1
Carburetion by	Weber dual barrel Type 24/30
Max. bhp @ rpm	75 at 4500
Max. torque @ rpm	101 lbs./ft. @ 3500
Idle Speed	550 rpm

DRIVE TRAIN:

Transmission ratios (overall)	I	13.79 to 1
	II	6.96
	III	4.77
	IV	3.31
	Reverse	14.82
Final drive ratio (test car)		3.88/1

CHASSIS:

Wheelbase	
Front Tread	59 ins.
Rear Tread	51¼ ins.
Suspension, front	Independent-hydro-pneumatic
Suspension, rear	Independent-hydro-pneumatic
Shock absorbers	Citroen suspension unit.
Steering type	Rack and pinion.
Steering wheel turns L to L	3
Turning diameter	36 ft. 1 in.
Brake type	Front inboard disc; Rear drum.
Brake lining area	161.82 sq. ins.
Wheel studs, circle diam.	Center lock nut.
Tire size	165 mm x 400 mm.

GENERAL:

Length	189 ins.
Width	70½ ins.
Height	58 ins.
Weight, test car	2500 lbs.
Weight distribution, F/R	66¾/33½
Weight distribution, F/R, with driver and one passenger	68/32
Fuel capacity	17 gallons.

RATING FACTORS:

Bhp per cu. in.	0.686
Torque (lb-ft) per cu. in.	.87
Pounds per bhp, test car	33.3
Piston speed @ max bhp	2955 fpm

MOUNTAINEERING

The 2000 mile jaunt from desert floor to mountaintop seemed no more of a problem than a quick chug from front door to market.

It was this rough terrain rather than fatigue or stall that finally stopped the Lambretta. Talus from this point on made mobility impossible.

BY GRIFF BORGESON

IT'S a rare motor sport enthusiast who doesn't have a latent, devilish desire to experiment with two-wheeled transportation. Generally the impulse is tempered by the knowledge that 'cycles of thoroughbred quality cost anywhere from $800 on up – a lot to pay for the satisfaction of a whim. Obviously motor scooters are far more practical financially, but nearly everyone tends to regard them as barely one step beyond Junior's kiddie-car. This is a mistake. Over a period of several years, and through several stages of the machine's refinement, I have put a few thousand rugged miles on a Lambretta scooter, and I can testify that for go-anywhere ability, for the kind of engineering that proves the world's root-relationship to "ingenuity," and most of all, for real kicks, it's a hard one to beat.

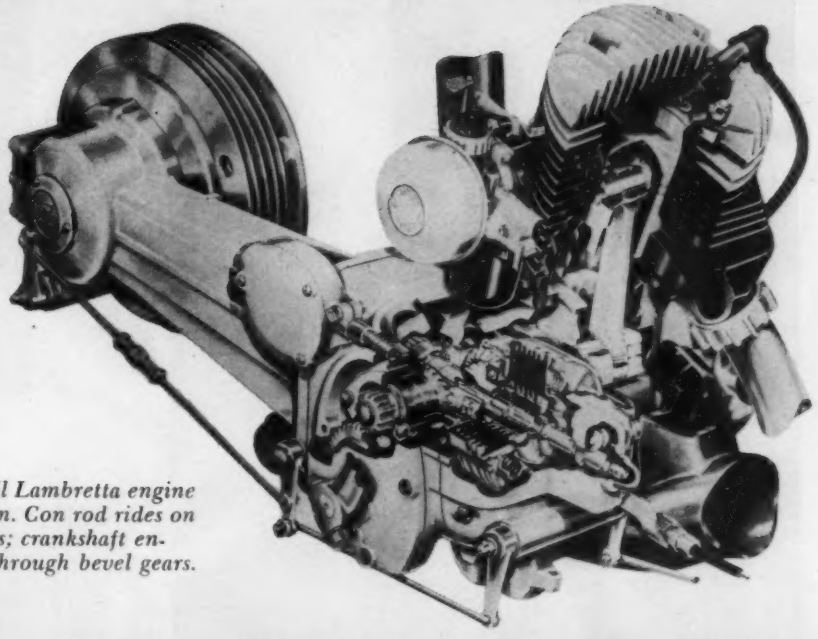
I first became aware of the Lambretta, back in 1929, through reading the French, Italian, German and Swiss car publications. In these, I read, from time to time, accounts of a scooter that had been ridden from Paris to Tibet, from Milan to New Delhi, Rome to the Arctic Circle, Rheims to Rangoon, and from Algiers to Cape Town. Obviously, the machine that could do all this was no jangling gravel crusher hastily stamped out of old Coke signs. I investigated.

The Lambretta factory in Milan sent me bales of literature about the little two-wheeler and as years went by kept me posted on the progress of its design and distribution. In 1954, they began shipping machines to the U. S., and somewhat diffidently, I made a suggestion. Would they, I asked, let me give the Lambretta an ultimate-type road test—from the lowest point in the U. S., at Bad Water, Death Valley, to as high as I could get in the towering White Mountain range near Bishop, California? The factory people were not only willing but downright enthusiastic. They let me use a brand new machine, answered every technical question in minute detail, and even shipped me a special Dell' Orto carburetor with variable mixture control for use over extreme altitude ranges.

It takes a good thousand miles of use to limber up a Lambretta to the point where maximum revs can be reached with ease, and every 50 miles makes a big difference in its strength, smoothness and silence. I broke the machine in through Beverly Hills traffic and on cow-trails and footpaths in the meandering Santa Monica range. When 500 miles showed on the odometer, I lit out for Bad Water.

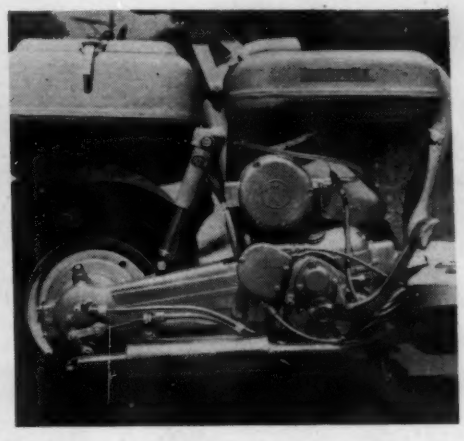
From Beverly Hills to Bad Water to Bishop was easy. The

BY MOTOR SCOOTER



Cutaway detail Lambretta engine and drive train. Con rod rides on roller bearings; crankshaft engages clutch through bevel gears.

Extra passenger is carried in tandem on back seat. Of course, it's better if the gal wears slacks.



Close-up of engine, drive and rear wheel unit. High gearing and wheel hop finally stopped the two seater.

Change of tires is easily accomplished due to split rim wheel which requires only the wrench supplied with bike.

Lambretta's ride on pavement was ideal. But I learned that the machine is best suited to unhurried transportation. Up to 35 mph it felt wonderful. Beyond that it felt insecure. It uses 4.00 x 8 tires and its center of gravity is very close to the ground; the hubs are just eight inches from the road. The small tires make small patches of contact with the road and the low CG makes it respond very sensitively to any passing crosswind. You learn to sense these responses early and not to overestimate the tire adhesion. You learn to make haste slowly.

Still, the 2000 miles and the better than 4000 ft. rise in elevation from the desert to Bishop were no more of a problem for the Lambretta than a quick chug from front door to supermarket. But from here on it was going to be tough. Bishop lies at 4147 feet, in the approximate middle of the Owens River Valley. The Sierra Nevada, heavily timbered and heavily populated in the summer with campers and sportsmen, forms the skyline to the west. To the east looms the equally high White Mountain range. These are desert mountains. They get little snow, have little timber and water, no tourist traffic and no Forest Rangers to ask what the hell you're doing up there on a motor scooter. I headed into the Whites for first-day reconnaissance.

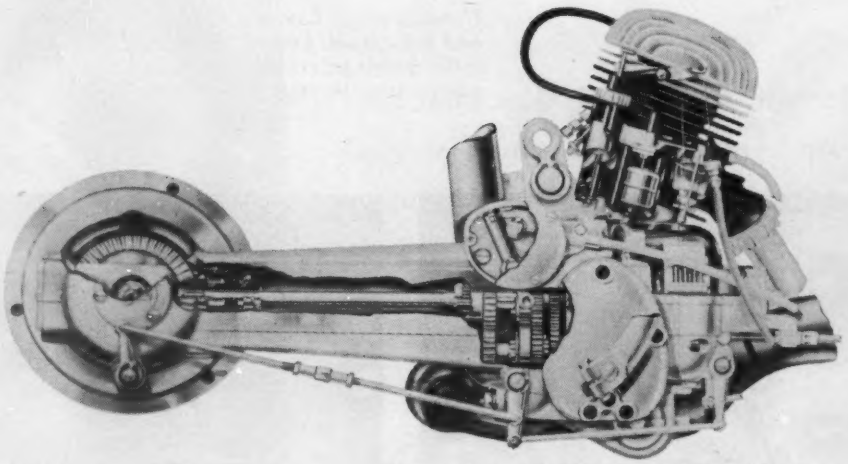
The quick way to the top of White Mountain Peak, 14,242 feet up, covers just 38.5 miles, the worst of it being between about 6000 and 10,000 feet, on a very rough trail that hangs more or less vertically on one of the walls of Silver Canyon. This canyon would have been an inspiration to Doré when he was illustrating Dante's "Inferno." The desolation is total; the scale overwhelming.

It was the middle of August, and only a few patches of snow remained on the high peak that I hoped to reach. The climb up the canyon begins at about 4500 feet and it follows the water-course for a couple of miles before it lights off across the faces of mountains. I had to ford the stream repeatedly and although the water came over the floorboard many times, it never affected the Lambretta's well-shielded ignition. I made good time up the twisting, strewn trail, and the needle on the Taylor pocket altimeter marched steadily past 5000, 6000 and 7000 feet. But at 7800 I found the Lambretta's Achilles' heel.

It happened about half way up a 3000 foot long, 20 percent grade that was littered with sharp shreds of loose rock. The

The watercourse at Silver Canyon had to be forded many times during trip. To find limit, SCI's chief tester made 10 passes before ignition quit.

The Lambretta's front running gear is suspended by coil spring contained at the bottom of the fork.



Power train detail. Drive shaft doubles as a torsion bar, and cushions various moving parts against sudden changes in load. Bearings are mostly rollers.

machine had plenty of power as long as the engine was revving high. But this made the rear wheel rev high too, and the wheel kept breaking loose and hopping on the slippery surface. I'd back off on the throttle to avoid over-revving, but between this and the wheel hop the engine would stall within a few feet.

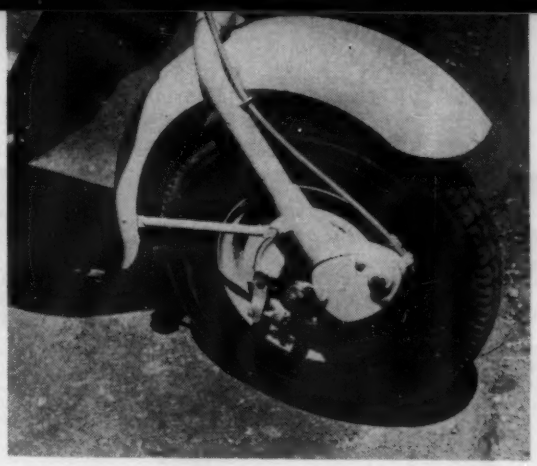
I tried several techniques to get up this long grade. When I slipped the clutch with the engine revving high there'd be a good torque with low revs at the rear wheel. But after three 20 foot advances the little multiple-disc clutch froze solid; fortunately, it snapped back to normal in about 10 minutes. I let half the air out of the rear tire to get more traction, but this resulted in ripping the valve stem from the tube of a very nice Pirelli; fortunately, again, the machine was equipped with a handy continental-type spare. I knew, from having toted passengers on the tandem seat, that the machine pulled best with a heavy load at the rear. I considered piling rocks on the luggage rack, but rejected the idea; the rear end was hopping too badly.

The one remaining alternative, aside from putting the machine on my back, was to walk it up the grade. But this, I discovered, had to be done at a speed that was closer to a trot than a walk. And gamboling uphill at 8000 feet while steering and supporting a 200 pound machine was a job for a brace of Himalayan Sherpas, not for me. I abandoned the Silver Canyon approach to the peak.

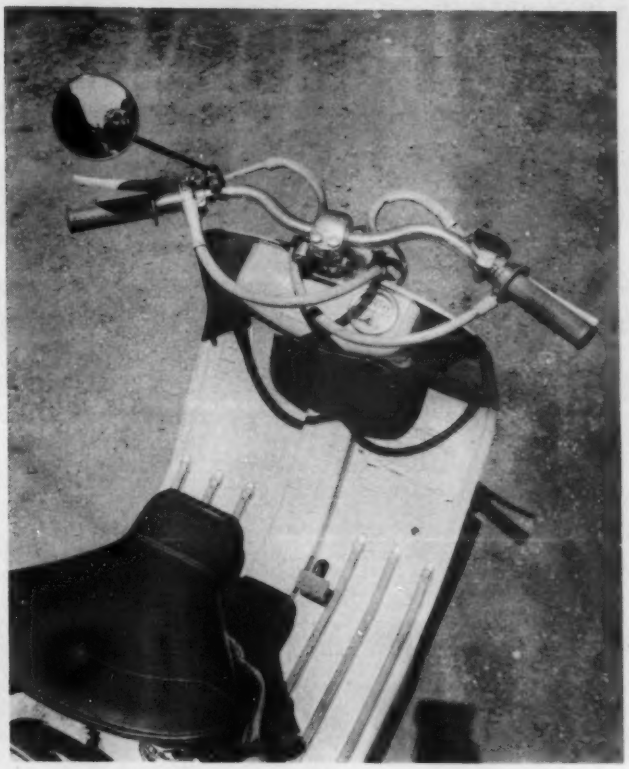
The next day I decided to explore the Lambretta's high-altitude limitations under less severe conditions. Before starting out I removed the head gasket to gain a little compression and took off the muffler to shed its back pressure. This time I headed west, up the Pine Creek Canyon road into the Sierra Nevada and toward the headquarters of the world's highest tungsten mine, 7600 feet up. The road was steep and tortuous but it was paved. The Lambretta was able to get reasonable traction and it flew up the mountain to the mine office. When I arrived the men in the office dropped what they were doing, stared, and came out incredulously to look at the machine. Hill-climbing cycles had been seen here, they told me, but never a scooter.

Beyond the office a gravel road climbs steeply to the diggings higher up. At 8200, I was stopped by blasting operations and had to turn back. The descent to the floor of the Owens Valley impressed me with the wonderful virtues of the Lambretta's brakes. Front and rear the ferrous metal drums are bonded to deeply finned light-alloy muffs. The little machine made in the shadow of the Alps scampered down from that granite vastness in top gear. Just a touch on the brakes was all it took to cope safely with the countless downhill curves, and there was never a trace of fade.

On my third day in Bishop I tried another approach to White Mountain Peak, via Westgard Pass (about 50 miles south of the peak) and a trail that follows the summit of the range. This time I got to 10,600 feet before I ran into



Typical group of Lambrettisti on tour of Alpine passes. Paris-Tibet, Rheims-Rangoon, Algiers-Cape Town, are among successful trips.



Driver's view of the Lambretta shows the lack of instruments except for speedometer and odometer.

Wheel-hop and gearing on the twenty percent grade made it necessary for the bike to be portaged by jeep over the pass.

Lambretta trucks are used throughout the world. Here one of the species, loaded with cargo, begins a long climb through an Alpine pass.

PERFORMANCE

ACCELERATION:

From zero to	seconds
20 mph	
30 mph	4.0
40 mph	18.9
Standing ¼ mile	28.2

SPEED RANGES IN GEARS:

I	20 mph
II	30 mph
III (top speed)	52 mph

SPEEDOMETER CORRECTION:

None; speedometer accurate.

FUEL CONSUMPTION:

Average driving ..... 110 to 130 mpg

SPECIFICATIONS

CHASSIS:

Wheelbase	50 ins.
Suspension, front	Coil spring.
Suspension, rear	Torsion bar.
Shock absorbers	Double-acting telescopic at rear.
Brake type	Mechanical; finned aluminum drums.
Brake lining area	15.7 sq. ins.
Tire size	4.00 x 8

GENERAL:

Weight, test machine	208 lbs.
Fuel capacity	1.9 gals.

RATING FACTORS:

Bhp per cu. in.	.67
Bhp per sq. in. piston area	1.52
Lbs. per bhp (test machine)	34.7
Piston speed at 60 mph	2283 fpm
Piston speed at max. bhp	1807 fpm
Brake lining area per ton	151 sq. ins.

Motor Scooter

(Continued from page 48)

the kind of situation that had stopped me a couple of days before: a long, steep, rocky grade, too many revs at the rear wheel, and wheel-hop. I thought a lot about those guys who had gotten to Tibet, and really felt for them.

By this time I was determined to conquer the mountain if I had to do it with a Cat 'dozer. I enlisted the aid of California Division of Highways engineer Dick Chaney, a former foot-mountaineer who now climbs by four-wheel-drive jeep. He agreed to portage the Lambretta on the jeep over the stretches it couldn't pull. Together we made it to 13,250—as high as a land vehicle can go on the peak. The last 1000 feet or so rises at a steep angle and is covered with gigantic boulders that the weather has wrenched from the body of the mountain. A few horsemen have been to the top. So have a pair of zealous motorcyclists who took their machine apart and carried it to the summit, reassembled it and took pictures of it there.

At 13,250, the Lambretta scooted among the blocks of talus with almost as much pep as it had at sea level. The air was thin, cold, clear; the view spectacular. From here you look *down* on the Sierra Nevada range to the west across the Owens Valley—down on the range's last surviving glaciers slowly carving their granite amphitheaters. Here there is no litter of empty beer cans and almost no life—just an occasional eagle, a mountain bluebird, big deer in the distance and friendly, curious marmots.

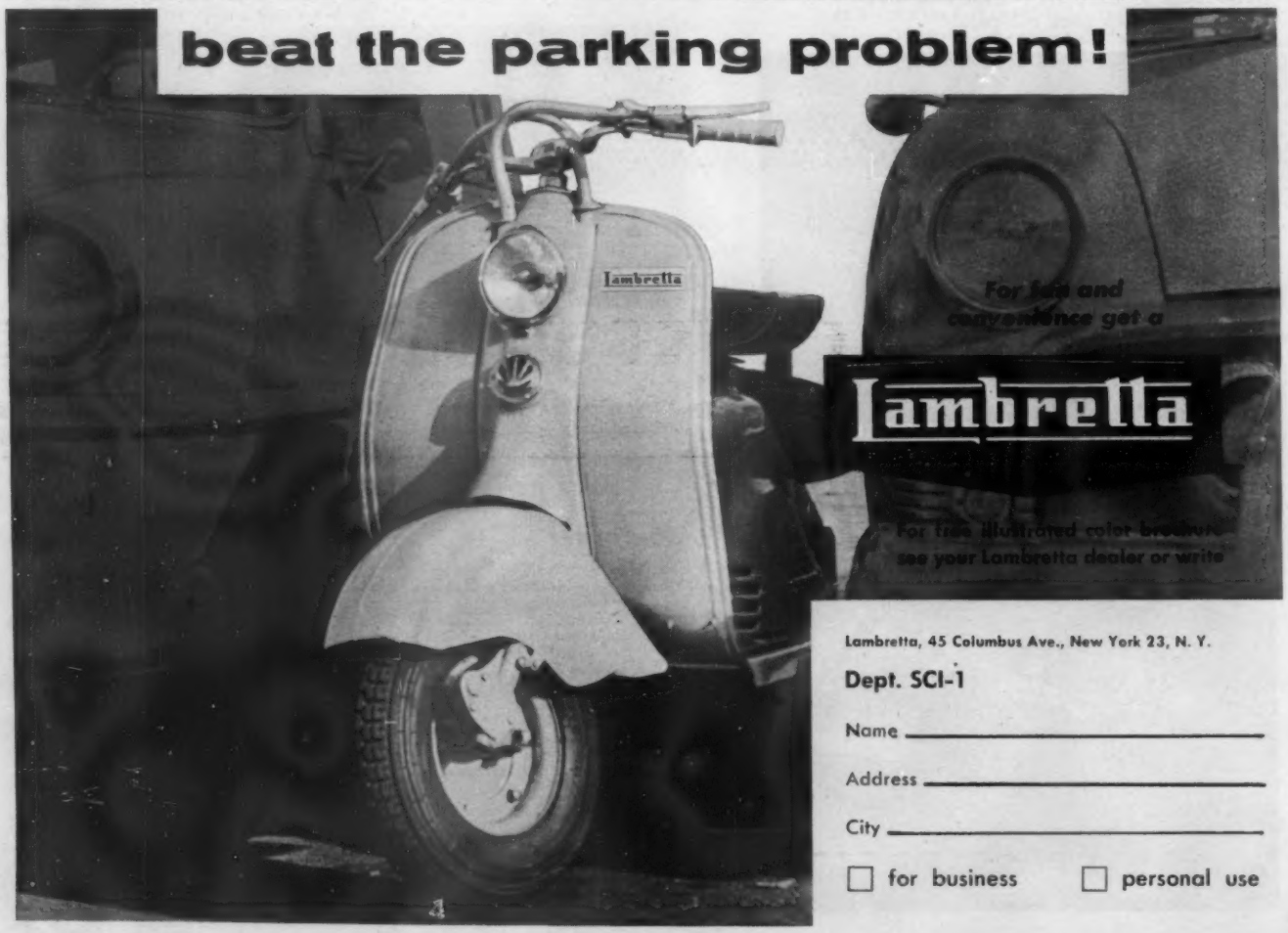
REPORT TO MILAN

Naturally, I reported to Milan on the White Mountain caper. I told the factory people what had stopped the machine, suggested that lower gearing and stiffer rear suspension could enable the Lambretta to put most of the country's pack trains out of the horse and mule business. The Lambretta I used obviously was equal to anything on pavement. Better geared and snubbed it could be the answer to many outdoorsmen's prayers.

And this is precisely what today's Lambretta, the 150, is, and the factory achieved the effect without changing the gear ratios. The new machine has 6, rather than 5 bhp. It has a husky telescopic shock absorber on the rear suspension to control the rear-wheel hop among other things. It's a more forceful machine, but the added urge goes to pulling power rather than to speed. The 20 percent increase is almost entirely channeled into better low-speed torque by maintaining peak revs at the original level. My impression after riding the 150 is that the few limitations of the earlier models have been eliminated. There is one exception: the front suspension is still on the soft side—not just for cross-country work but for bumpy pavement as well. While the rear-wheel is smooth and almost vibrationless, the front wheel still bottoms too easily. However, I can't wait to go mountaineering again the easy way, by Lambretta.

The new 150 differs hardly at all in basic layout from the original 125 invented at the end of World War II by Ferdinand Innocenti and developed by engineer Pier Luigi Torre. But a close examination of the seven or eight Lambretta models that have appeared since 1947 shows that each part of the vehicle has undergone constant refinement. It is no more than just to call today's 150 a jewel of design and workmanship.

Griff Borgeson



Presenting the...

Simca V8

SIMCA V8 "VERSAILLES"

30 MILES PER GALLON • 85 HORSEPOWER • 95 MILES PER HOUR

HERE it is . . . the new French Simca V8 "Versailles" . . . now being shown and sold in Simca showrooms all over the country. This is the *practical* imported car . . . new . . . modern . . . and designed for today's driving. The Simca "Versailles" is different and wonderful. It provides comfort plus large passenger and luggage space not found in other imported cars. It has modern elegant lines, colors and interiors all fresh and new. It is inexpensive to buy and economical to operate . . . getting fantastic gasoline mileage.

And with all these features the Simca V8 "Versailles" handles like a sports car. Several top professional race drivers recently put this car through some sizzling laps on a Southern California road race course and found that the Simca V8 "hangs-on" in the corners better than many sports cars. All of the drivers praised the power and handling of the car highly. Of course this car is not a racing car, but it is a car that can take a severe beating and provide that extra margin of safety when you need it. Its quick handling makes the Simca V8 a real pleasure to drive in city traffic and its V8 power and road-hugging ride make cross-country trips pure enjoyment.

The "Versailles" comes equipped with a package of 19 extras, worth about $300.00, included in the purchase price at no extra charge.

We have brochures, technical figures, specifications and road test reports . . . and we'd like to send them to you so that you can go over them point by point to see how much the Simca V8 "Versailles" has to offer. But to *really* be convinced you should go into your nearest Simca Dealer and take this amazing V8 out on the road for your own test . . . then you'll know why auto editors, race drivers and especially our customers are so excited about this car.

Drop us a postal card and we'll be glad to send further data and the name and address of your nearest Simca Dealer.

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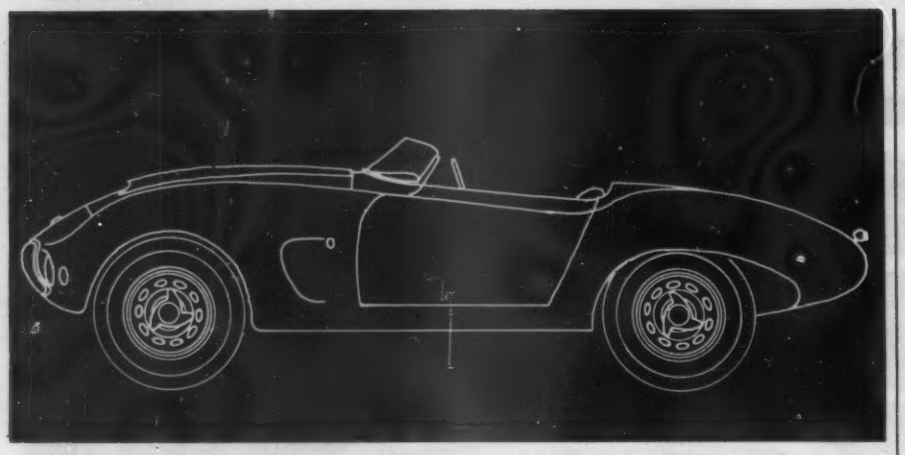

ARNOLT-BRISTOL BOLIDE

Race car or road car? The Arnolt-Bristol Bolide combines the best features of both into a prime specimen of that rarity, the true high performance sports car.
Repeating last year's victory, the Arnolt-Bristol Bolide finished 1, 2, and 4 in the two litre series production class in the 1956 12 hour Sebring Grand Prix. Yet its 2 litre engine is as tractable in traffic as it is ferocious on the track. Full road equipment. SCCA approved for production car racing. Not even a spark plug change is required to go from the supermarket to the starting line. $4250.

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Imported—baked enamel colors on sturdy solid brass bases—authentically reproduced—hand finished by European craftsmen—superb collectors items—approximately 3½" overall (fasteners attached). Partial list: B.A.R.C.; Auto Club of France, Rome, Brazil, Denmark, A.D.A.C.; Touring Club of Belgium, Venezuela, Tyrol. Send 25c (refunded with order) for our illustrated catalog of foreign car badges, flag medallions, etc. $4.50 each postpaid. Set of any three only $12.50 postpaid.

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New Charm Bracelet is exclusive design and import. The eight miniature international auto club badges are excellent examples of Old World craftsmanship and are hand finished in brilliant baked enamel color combinations with lettering and design details in raised gleaming silver. The Sterling bracelet is a beautiful carved effect flat link design with positive catch. Our direct to consumer low price only $6.95. 10% Fed. excise tax incl.

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CHARMANT IMPORTS, Garden City 20, N. Y.

Bonneville

(Continued from page 15)

nitromethane and five percent benzole. As team member (and F3 booster) George Rowell put it, "The engine didn't last very long but it went awful fast." Actually, the damage was a seized rod and the rebuild cost will be in the low two figures. Belmont San Chez also entered a stock production Stude Golden Hawk which whistled through the traps at better than 133 on gasoline.

There were many memorable performances by hot rods at Bonneville this year but one that will be remembered for years to come was the fabulous run made by Ermie Immerso of Phoenix, Arizona on the last morning of the meet. His mount was a traditional belly tank with wheels and axles dragging in the wind. With a Chrysler engine burning *only methanol* (no nitrol) he achieved a speed of over 219 one way and a record 213.190. And he began building the car only two months before the Bonneville Nationals!

These speed trials are a unique test bed for ideas. What can be accomplished with nitrated fuels has been explored on the salt to a profound degree. This year, for the first time, there were gasoline classes; opening up a neglected area of research that already has been highly productive and useful. The hemispherical combustion chamber head was in evidence this year as never before. The Ardun head for Ford engines, a voice in the wilderness for years, was exploited in a big way. Continuous-flow fuel injection for fuel or gasoline was utilized by all the first machines, and the excellent Hilborn product was the basis for many privately-made variations. Superchargers played a very important role in speeds realized and attempted; supercharger know-how is spreading. And new aerodynamic ideas paid off, just as engine-tuning ideas did.

We of Sports Cars Illustrated, of course, are most intrigued by the growing importance of sports cars in American motor sport events, including the Bonneville Nationals. Sports cars played a more important role on the salt this year than ever before, and this is only a beginning. They will be much more important in the future. Only at Bonneville can you learn the terminal velocity of your Jag, 4.9 Ferrari, Buick-Kurtis or home-built special. But fast or slow, all sports cars are welcomed by the SCTA. Next year you might try to take in the Nationals, either as a contestant or observor. Sports Cars Illustrated will publish the '57 regulations and details as soon as they are available.

Griff Borgeson

VOLVO

the car with

SPEED ECONOMY COMFORT SERVICE APPEAL

"THE DUETT"
Station Wagon

THE PV 444
Family Sports Car

Products of Superb Swedish Engineering

SPEED – The outstanding Volvo PV 444 Sports Engine develops 70 bhp at 5500 rpm with a maximum torque rating of 75.9 pounds-feet at 3000 rpm. A "winner" in every sense of the word, Volvo has chalked-up six straight wins in six starts in California road races driven by Ron Pearson. *ECONOMY* – Enjoy "Big Car Operation" with small car economy when you drive the VOLVO. Up to 40 miles per gallon . . . no engine rebore for well over 100,000 miles. Overhead valves with twin SU carburetors give you "Jet" take-off from zero to 92 mph in a mere 45 seconds. *COMFORT* – Volvo PV 444 offers comfort for a family of five, yet gives you that luxurious continental feeling of power and importance. The spacious luggage area in the rear is the answer to the businessman or family man on routine or extended travel. Whether you choose to select the PV444 or the Volvo Duett (Station Wagon), you will agree that Volvo is in a class by itself and is rated the LEADER by sport car enthusiasts throughout the world!

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VOLVO

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Distributor for the 11 Western States

Riley

(Continued from page 19)

sedan known as the Monaco, which rapidly created the biggest demand in Foleshill's lengthy annals. Then, within months of this debut, there were repercussions in the competition world. When a pretty girl walks along the avenue, passing aesthetes are apt to take a covert hinge and figure to themselves how she would look in a bathing suit, or better still, without one. It was something like that with Mr. Riley's small automobile. At the amateur and professional level both, speed practitioners began visualizing the effects of trading the closed body for a featherweight two-seater, souping the already wide-awake engine and putting suitable reefs in the existing chassis.

First to translate these dreams into reality — with the consent and collaboration of Riley (Coventry) Ltd. — was a rising knotfarm at Brooklands track known as Thomas Inventions Developments, Ltd. Partners in this enterprise were J. G. Parry Thomas, three-time holder of the Land Speed Record, and Reid A. Railton, who was later to design several of Campbell's LSR-breaking Blue Birds, and also John Cobb's two Napier Railtons.

Result of the Thomas-Railton teamwork, unveiled late in 1927, was the ground-grazing Brooklands Riley, one of the sauciest British eleven-hundreds ever built in the classic inter-wars design tradition. Thomas, unfortunately, didn't live to see the launching. He was killed six months earlier in an attempt to add a fourth LSR notch to his screwdriver handle.

The standard chassis had been bisected amidships and rejoined with a foot and a half of each side rail missing, reducing the wheelbase to 91½ inches. The rear springs, normally set below the frame, were placed alongside it, resulting in a radical lowering of the whole car. To shift weight onto the back wheels the engine was shunted rearwards and the radiator mounted behind instead of above the front crossmember. The occupants sat just six inches off the ground and could easily touch the pavement by hanging an arm out over the low-cut body sides. Two Solex carburetors and a four-branch exhaust manifold were added to the engine, as was a coolant pump. (Water circulation was by thermosyphon only on the Monaco). Presumably the compression ratio was increased, and certainly the oil pressure was.

Although the Brooklands Nine, in its own right and without advanced modification, ran up a considerable total of speed successes in many parts of the world, its Class G score was surpassed by unrecognizable variants developed independently of the parent factory. Best known of these was the work of the legend-haloed Fred Dixon, whose 1100 cc track car, known as a Riley for want of a better name, was almost 100 percent Dixon in everything but its engine-gear unit; and even the engine, as regards its cams, porting, pistons and carburetion, started about where Foleshill left off. In 1932 during a continuous downpour of rain it broke five international Class G records between 50 and 200 kilometers — including the hour — at speeds ranging above 111 mph. The significance of this feat, at that time, was that the Mongrel Riley was unblown, whereas the MG's, which had hitherto largely dominated the class, were very much blown.

Incidentally, it is probable that this Dixonized Riley was the first car in the world to feature the low-level hori-

(Continued on page 57)

STAHLWILLE GERMAN-MADE TOOLS

Whitworth size—Set of 4 Stabil End wrenches, drop fored Manganese - Silicon steel, Nickel plated. ⅛ to 9/16 W.....$3.20

Set of 4 Stahlwille Motor End wrenches, fine mechanic's quality, drop forged Chrome Alloy steel, Chromium plated. ⅛ to 9/16 W.....$5.45

WHITWORTH COMBINATION WRENCHES

Forged Chrome Alloy steel, 12 point box end.

⅛ W	$1.05	⅜ W	$2.38
5/16 W	1.70	7/16 W	3.02
¼ W	1.86	½ W	3.38
5/16 W	2.19	9/16 W	3.55

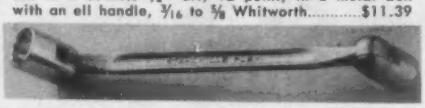
BOX WRENCHES

Long handle, 30° offset, extremely thin 12 point ends to fit into tight spots, Chromium plated. Guaranteed stronger than any bolt. Set of 4, ⅛ to 9/16 Whitworth. $8.90

Set of two short 15° offset Box wrenches, 3/16 x ¼ W and 5/16 x ⅜ W, 12 point, burnished finish.....$2.50

Sockets, drop forged Chrome Alloy steel, hot broached 12 point, ⅜" sq. dr., Chromium plated. Set of 5, ⅛ to ⅜ Whitworth.....$4.33

Set of 8 Sockets ½" dr., 12 point, in a metal box with an ell handle, 3/16 to ⅜ Whitworth.....$11.39



Stahlwille Flexi box wrenches, 12 point socket type ends swivel to any position. Chromium plated and polished. Chrome Alloy steel.

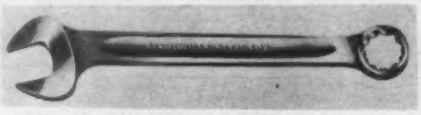
3/16 x ¼ W	$3.39	5/16 x ⅜ W	$4.08
12 x 14 mm	3.39	17 x 19 mm	4.08

Thread Restorer Files, used like a file, a few strokes restores damaged thread. Special design permits the restoration of internal threads to a depth of ¾". Each restorer has 8 surfaces marked with thread size. Specify Whitworth or Metric.....$5.20 each

METRIC END WRENCHES

Set of 5 Stabil End wrenches, drop forged Manganese-Silicon steel, Nickel plated, 6 x 7, 8 x 9, 10 x 11, 12 x 14 and 17 x 19 mm.....$3.20

Five Stahlwille motor end wrenches, 6 x 7, 8 x 9, 10 x 11, 12 x 14, & 17 x 19 mm, chromium plated, in a metal clip.....$4.95



METRIC COMBINATION WRENCHES

Forged Chrome Alloy steel. Chromium plated. Set of 4 Midget Combination, 4, 4.5, 5, 5.5 mm.....$4.07

8mm	$1.05	12mm	$1.64	17mm	$2.28
9mm	1.05	13mm	1.69	19mm	2.49
10mm	1.37	14mm	1.86	22mm	3.02
11mm	1.48	15mm	1.86		

Metric Box wrenches, short handle 15° offset, burnished finish, 6 x 7, 8 x 10, 9 x 11, 12 x 14, & 17 x 19 mm.....$4.95

Sockets, seven of the most popular sizes, 9, 10, 12, 14, 15, 17, & 19 mm, ⅜" sq. dr. 12 point.....$6.03

Eleven sockets all sizes 9 to 19 mm, ⅜" dr.....$9.39

Set of 8 Sockets ⅜" dr., 12 point, in a metal box with an ell handle, 9, 10, 11, 12, 13, 14, 17, and 19.....$9.40

Set of 5 Deep Sockets, ⅜" dr., 12 point, 10, 12, 14, 17, & 19 mm.....$6.15

Uniflex sockets, ½" dr., built in universal joint, hexagon opening, 12, 14, or 17 mm.....$3.47 each

Inhex sockets, ½" dr., for Allen-type bolts on German cars, 5, 6, 8, or 10 mm.....$1.20 each

DB 8 mm special for Mercedes.....$1.85 each

DB10 mm Mercedes, Porsche, or VW.....$2.25 each

36 mm ¾" dr. Socket for VW rear hub.....$2.85 each

Uno wrench, a 17 mm box wrench with built in magnet which fits the upper two engine mounting bolts, enabling one man to easily remove Porsche or VW engine.....$3.25

VW Sparkplug socket ½" dr., #1051Z.....$2.28

VW or Porsche oil drain socket, ½" dr.....$1.70

Ratchet #1415, built in 10 & 14 mm socket greatly simplifies clutch adjusting on Porsche & VW. Also used to remove main jet on VW carburetor.....$9.23

Thin single ended 27 mm wrench for Porsche & VW front spindle nuts and steering gear.....$1.50 each

End wrench with one jaw set at 75° angle, can be used to remove Porsche carburetors, 12 or 14 mm.....$1.32 each

Reweb your old safety belt. Black 2" Nylon 3600 lb. test webbing for cam type buckles.....50¢ per yard

Chrome-moly 3 slot floor fittings with bolts and washers.....75¢ pair

Triangular welded ⅜" eye bolts for 2" webbing.....$1.00 pair

12 volt resistors, adapt 6 volts radios, lights, heaters, etc. to 12 volt systems.....2 for $3.00
Instructions furnished.

Goggles, German import, similar to Army B-8 type but especially made to fit over eyeglasses. Rubber frame with Clear, Amber, and Green interchangeable lenses. Can be used for racing, cycling.....$4.35

Whitworth ½" sq. dr. Sockets, Hot broached, 12 point. Special reduced price for December.

Set of 5, 3/16 to 7/16 W.....$3.00

Set of 7, 3/16 to 9/16 W.....$4.95

Set of 9, 3/16 to 11/16 W.....$6.95

Minimum order $3.50 please. Stahlwille tools are available at many Imported Car Agencies. It pays to carry a set in your car.

Prices include postage. Add 4% Sales Tax in California.

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Porsche Jeep

(Continued from page 40)

Power for the car is supplied by a 1586 cc., flat-four, air-cooled engine that is familiar to Porsche owners all over the world. Fitted with cast iron cylinders in place of the light metal ones found in the sports car engine, and with a 6.5:1 compression ratio along with a single downdraft carburetor, the powerful mill turns up 50 bhp at 4000 rpm. The front axle can be engaged or disengaged while moving simply by turning a foot operated lever positioned just to the right of the accelerator; all gear shifting in the five speed box is done by one lever centrally mounted, four out of the five forward gears being fully synchronized.

Weather equipment includes a folding fabric top complete with plexiglass side curtains. Dual electric windshield wipers and the familiar VW/Porsche heating-defrosting system assure maximum protection from the elements. Dash board instruments include a speedometer, oil temperature gauge, fuel tank gauge, in addition to the usual generator and oil pressure warning lights. On the prototype which I drove a tach had been installed in the middle of the dash but it is not clear if this will be standard equipment in the new models. Brakes are standard Porsche while the parking brake was obviously taken from the Volkswagen. A 24 Volt electrical system is fitted and provides enough power to operate radio equipment for long periods. Operating directly off the crankshaft is a power take off rig which when hooked up will run all kinds of auxiliary equipment. Fantastic accessibility to the engine compartment is provided by a lid which when swung up and out of the way provides enough elbow room to keep any mechanic happy. All seats are quickly removable to carry bulky loads or for cleaning purposes. The steering system is light, very positive and free from any backlash or road shock. One feature of the car which I liked was the possibility of quickly going into four wheel drive at any speed if suddenly you found yourself on ice or in a slippery curve. Physically the "Jagdwagen" is as rugged as any car of its type — perhaps more so. In it the Porsche engineers have managed to combine all of the essentials of a military vehicle: low silhouette, floatability, go-anywhere capability, and yet have kept it amazingly simple and easy to service. There are no doors, you merely climb over the "gunnels" and settle yourself down into a tight-fitting bucket seat, not unlike getting into a bathtub. Well-placed hand grips allow you to get a good position when off the highway, and as an old jeep owner, I was amazed at the feeling of security when negotiating steep grades that I had never felt before in an open jeep. This is due to the excellent weight distribution which removes any top-heavy feelings. When fording streams it is impossible for water to get into the vehicle by virtue of the pontoon-like frame — and the engine sits very high behind you out of the reach of normal water levels. Without chains we made remarkable progress in snow, and on the Autobahn top speed seemed to be in the neighborhood of 60 miles per hour — the tach reading 4000 rpm. In traffic, visibility is of course excellent and like the VW, skillful use of the gears will gain surprisingly good performance. The windshield folds forward onto the top of the fuel tank and is an ideal place for carrying game or other bulky loads when operating in the back woods.

Suspension system of the "Jagdwagen" is typically Porsche — torsion bars, independent all wheel suspension with vertically mounted hydraulic shock absorbers. The ride incidentally is like any other jeep — hard, but on or off the road this new Porsche is an amazing performer that can't help but make new friends throughout the world for an old and famous name.

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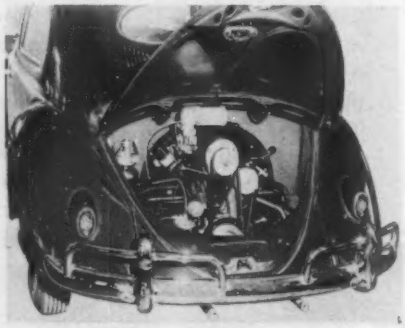

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DS-19

(Continued from page 45)

when seeking the brake can be downright dangerous under emergency conditions, and after 300 miles one may be still a bit conscious of the "lost brake" feeling. As the button provides full brake with a mere half inch of travel, the driver requires considerable practice to obtain a nicety of control. Once accomplished, the button proves remarkably sensitive, permitting the most delicate use of brake force. And it's quick enough to permit precision "tapping" on slick surfaces.

Driving in snow poses a standard FWD problem—to use chains or mush through, trusting to traction from the Michelin 165 x 400 "X" low pressure tires with steel mesh cord construction. In questioning drivers who have made ski trips on snow covered European mountain roads, it is found that Citroën cars without chains or snow tires have gotten through where rear wheel-drive cars equipped with chains have not. The accepted procedure with Citroëns encountering difficulty in traction is to have two passengers ride the front end fenders for added ballast.

Returning to the engineering aspect of the Citroën DS 19, the four cylinder engine is rubber mounted, has no metal contact to body parts, and displacement is 116.5 cubic inches with 3.07 inch bore and 3.94 inch stroke. The cylinder head is aluminum, combustion chamber hemispherical, with large diameter valves inclined 60 degrees. A spark advance "octane selector" is kept at full advance with U. S. fuels, the compression ratio being a gentle 7.5 to 1. Developed bhp is factory-rated 75 at 4500 (R.C.A. rated 15.08 hp) and maximum torque is 101 pounds-feet at 3500 rpm. Carburetion is by compound dual throat Weber type 24/30 DCLC, in which the secondary barrel opens only after primary is wide open. This secondary feed definitely roughs up the engines extreme smoothness of first throat operation and cannot be tuned out, as is the case with many hemispherical chamber designs under full load. It does, however, provide much needed power under load conditions in all gears. The roughness is noticeable only to critical drivers and passengers say they do not feel it.

The carburetor tune *must* be made with an electric (shop) tachometer's aid. The entire synchronization of the power clutch and shift depends upon

(Continued on page 63)

(Continued from page 54)

zontal air entry slot which is now universal race practice. Mercedes is often credited with pioneering this shape and for the intake, first using it on its three liter Grand Prix cars in 1939. Dixon was seven years ahead of them. Contemporary Brooklands railbirds scoffed when he turned up with a pouty little slot measuring only 22 inches by 1½, foretelling chronic overheating. His ducting was so efficient that the car actually ran cooler than with a fully exposed radiator.

In the carburetion department, too, Fred Dixon was far ahead of his time. All his track Rileys, both fours and sixes, had a separate S. U. carburetor to each cylinder; and in 1934 his sixes anticipated Jaguar's 1956 thinking — *vide* the f.i. cars at Le Mans — by having a single sliding plate throttle.

FIRST SIX

The first six-cylinder Riley, put out in late '28, had an engine with identical dimensions with the Nine, making the displacement 1633 cc. In spite of its efficient head shape, porting and valve gear — again a repetition of the Nine theme — this one was a somewhat dim performer in its family carrying form; but it turned over a new leaf when they down-scaled it to 1½ liters and installed it, after suitable souping, in a sports racing chassis for events like Le Mans and the Tourist Trophy. Its finest hour was undoubtedly the 1934 Grand Prix d'Endurance, in which the little sixes from Coventry placed second and third on general classification (the only time in Le Mans history that cars as small as 1½ liters have been placed) and scored five finishers out of five starters. The only other Riley in the race, a Nine, copped the Index of Performance handicap.

In the T.T., which ranked as Britain's grande epreuve back then, Riley chalked up a record which wasn't equalled by any make, of whatever nationality, until the post-war emergence of the Jaguar. Their first victory, by a Nine in 1932, was at the highest average put up to that date; beating the race record that Rudolf Caracciola had set in '29 on a supercharger Mercedes, some six times bigger in displacement than the Riley.

Both of Riley's subsequent Tourist Trophy wins, in 1935 and '36, were gained on the four-cylinder 1½ liter engine which, early in '35, took over from the six of the same capacity in the sports racing field. On vitesse pure ground, meanwhile, meaning at Brooklands in England and Montlhery in France, Rileys of all calibers continued to put international class records through the mincer at an insatiable rate. Some of the best of these marks were the work of George Eyston and associates, whose exploits included a thousand miles at 102 mph, in 1934, on a 1500 cc six. This was the fastest thousand miles to date by a British car of any size.

It was that year, it may be remembered, that the E.R.A., all-time's most successful British contender in Continental road racing, made its appearance. And the E.R.A. engine, it is well to remember, was a direct development of Percy Riley's masterpiece, infallibly recognizable by the layout of its cylinder head and the manner of hoisting its valves. In the two liter version, Zoller blown at something around 26 psi, the E.R.A. engine generated 330 horsepower in the late 30's.

Policy on transmission, to take one example, seemed to be decided on an eny-meeny-miny-mo recitation. In 1926 they brought in the serviceable silent-third gearbox mentioned earlier. Then, in '33, came a preselector box with column shift and a centrifugal clutch — a laudable step in the direction of simplified motoring, even if the box did develop a grumbling appendix in middle age. Four years later, again, an ordinary gearbox reappeared, but with

(Continued on page 61)

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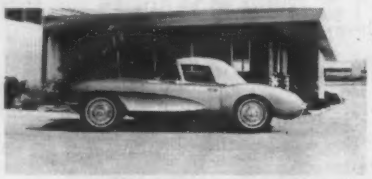

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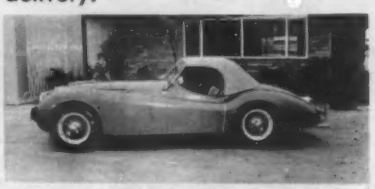

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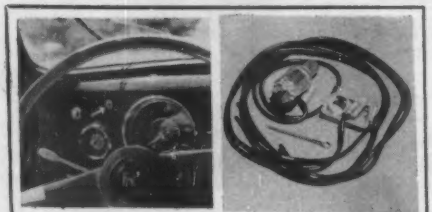

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Bugatti

(Continued from page 25)

than halfway chance of finishing in the money.

Dry Run

There were many problems that Sunday, July 23rd. It was one of the hottest days of 1911, and, through an organizational slip-up, the local cafes had run out of wine. (In France this amounts to a national disaster.) According to a chorus of press jeers, violent even for France, eight of the fourteen automobiles ready to go into action at Le Mans on the humid, cloudless morning of the 23rd, weren't worth bothering about. The Porthos, the Alcyon, the Excelsior-Boulogne and the Corre-La Licorne were old heaps resurrected for the sake of starting money, they suggested. The three 2 stroke Côtes were racing above their class, and as for the Bergati or Babati, or whatever its name was, nobody had ever heard of it.

The F.I.A.T. was the star of the line-up; a chunky, heavy-springed vehicle with a bluff expanse of dashboard and a steering column that came almost vertically up from the floorboards. It sounded like a locomotive; under the hood were 10.5 liters of slow-revving engine.

Next to the F.I.A.T. in size was a 185x160 Lorraine-Dietrich, driven by young Arthur Duray, another popular favorite. Almost as big was an ancient Cottin-Desgouttes. The only cars that bore any resemblance to a team, were three brand new Rolland-Pilain — racing-looking, four cylinder monsters with long, aerodynamic tails, a bore and stroke of 110x160 millimeters, overhead cams, and chain drive. In charge of these were three of racing's top names: Gabriel, Fauquet, and Rigal.

First to get the starting flag, at 8:01, was Maurice Fournier, local garage owner, motorcycle champion, and kid brother of a prominent driver. In the mechanic's seat of the four-year-old Corre-La Licorne was a Le Mans youngster named Louvel, who had never been in a race before. He had helped Fournier prepare the car after the garage closed for the night.

The others followed them off at one-minute intervals. The Fiat was ninth to start, with the Bugatti, driven by Ernest Friderich, right behind it. The crowd's first reaction to the Bug was a howl of laughter. Not only did it look too much like a toy to be taken seriously, but with typical Bugatti cockiness young Ettore had neglected to provide any place for the spare wheel. Since race regulations required a spare wheel, the mechanic had to sit holding the thing in his lap.

The cars started going to pieces at the first curve, when De Vere, shifting down on one of the Côtes, suddenly had an unemployed gear lever in one hand and a fast motorcar in the other. He abandoned ship. Fournier was the first around the course, having done the lap in 30 minutes, 29 seconds. This came as a surprise, for both Barriaux and Duray, who started within two minutes of him, had cars fast enough to make up the differences over 33.5 miles.

Les Boches

Though it was hardly 9 A.M., the sun was already fierce. Sweat misted the drivers' goggles, while spectators, rinsing their parched throats with white wine, fought a losing battle with the dust. At this point the butterflies went berserk. Great clouds of them, white and innocent-looking, rose from the fields. The drivers immediately dubbed them "les Boches," because they were wearing the German racing color, but in a few moments it was clear that this wasn't anything like a strong enough name. Windshields and goggles went opaque with the remains of smashed insects, and radiators were so completely plugged up that clouds of steam were soon trailing the contestants.

The first car to be put out of the race by the butterflies was Ollier's Côte, whose radiator burst like a geyser. Fauquet's Rolland-Pilain sizzled to a dead stop, its magneto gummed up with broiled butterfly hash. The Porthos, too, was in bad trouble. It limped to the pits with a cracked cylinder, winning the peculiar distinction of the least dramatic retirement of the race. Amusement was changing to respect as the little Bugatti burbled confidently along, the only car not bothered by butterflies or tire trouble. Friderich's mechanic would have welcomed the chance to get the heavy Rudge-Whitworth wheel off his knees for a while, but the Bug took the grandstand hairpin elegantly in top gear without a skid. All the other cars had to shift down, and most left black rubber on the road anyhow.

Only an hour and a half of the scheduled eight hours had gone by, and already the heat, the butterflies, and the generally ropy state of the competing cars had reduced the field

to nine. The pits were a puddle. Duray, who had a reputation for easy-going cheerfulness, was fed up with his old Lorraine-Dietrich which chewed up its fried tires and washed them down with radiator water. His sunny disposition was partially restored by his mechanic, who dumped the first bucket of water into the radiator and sloshed the next one over Duray.

Dust, Breakdowns, BUGS

Perhaps the biggest name in the race was Gabriel, who had made his reputation during the Paris-Bordeaux race of 1903, which he covered in such a dense cloud of dust that he had to steer by watching the tops of the poplar trees planted alongside the roads. What the dust had failed to do the butterflies almost accomplished, for his magneto was also piled thick with corpses; just as Fauquet's was. However, Gabriel and his mechanic managed to clean it up sufficiently to return to the race. The only retirement during the fourth lap was Riviere, whose Excelsior broke its timing gear.

As Maurice Fournier passed the grandstand, spectators remarked on how pale, tense and nervous he looked. He seemed to be driving in a way best calculated to tear the wheels of his Corre-La Licorne as he whipped around the dangerous curves at speed, pursuing Duray, who was in the lead.

Lying third, Hémerey decided that the sixth lap was his time for moving up in the F.I.A.T., and his Le Mans neighbors, Fournier and the young Louvel, were to be his first victims. Although he had started almost a quarter of an hour after the Corre, he had cut its lead down to under two minutes. On the 13 mile straight between Le Mans and the village of Eccomoy, he determined to wipe it out altogether.

For a while Fournier managed to keep a hood's length ahead of the F.I.A.T., but the Italian car relentlessly closed the gap, and, being newer and healthier, began to pull ahead. Hémery was two-thirds past the Corre when the French car's axle snapped in the middle. The wheels chaffed crazily on the brass radiator, the broken ends of the axle plowed a hundred yard furrow in the road, and then the car spun off, overturned into the ditch, and caught fire. Fournier was killed instantly; Louvel died in the hospital that evening.

Next on Hémery's list was an attack on the lead position, held by Duray. This was really a battle of titans, for while Duray's Dietrich had an engine capacity of 9.3 liters, (each of its four

(Continued on page 60)

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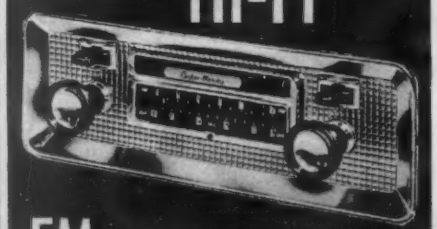

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(Continued from page 59)

pistons had an awe-inspiring diameter of well over seven inches!) the F.I.A.T. topped it with more than 1,000 c.c. to spare. It had 10.5 liters under its hood.

Victory At Last

Hémery caught up to Duray almost opposite the smoking wreck of Fournier's car, but history was not repeating itself. The Dietrich was fighting valiantly for every inch — until suddenly Hémery had matters all his own way. There was a crunch and the Lorraine-Dietrich's engine raced madly. Its differential had ceased differentiating between the relative merits of go and blow.

This left Hémery in the lead, followed by Barriaux in the Alcyon, Friderich in the Bugatti, Gabriel in the Rolland-Pilain and Leduc in the last remaining Côte. The crowd had completely lost interest in the race, since watching it consisted of long and thirsty periods of nothing to see but dust and butterflies followed at half-hour intervals by a chugging automobile. Only the Bug retained its charm; it was the liveliest thing on the track or in the stands.

There was hardly a flicker of interest when, in the eighth lap, Barriaux and the Côte failed to appear. Spectators were busy making scenes at the race *buffets* and roadside cafés which had run out of cool drinks. Officials, though, feared the worst, and were completely baffled by the fact that there were no reports of an accident along the 33 mile course. It wasn't until the race was over that the Barriaux story came out. His engine had started to miss. He got out to investigate, and keeled over. His mechanic bundled him back in the car and drove to a nearby farmhouse, where officials later discovered him, much improved by some apple brandy — the selfsame calvados that aided so many G.I.'s in the Normandy invasion.

It would be wrong to say the race ended. It just petered out after Hémery brought the F.I.A.T. in after its twelfth lap, for the police kept to the letter of their permit and opened the roads despite the fact that Friderich on the Bugatti was two laps behind, and the last Rolland-Pilain and the last Côte had three laps still to go. When the crowds were let loose the two big cars pulled over to the side of the road and waited. Friderich snaked the Bugatti back to the pits. Though there was hardly anyone left in the stands to see a tired official give him the checkered flag, he had made racing history. The orders that started coming into the new Bugatti plant at Molsheim soon proved that.

Merwin Dembling

(Continued from page 57)

embroideries in the form of a free-wheel and Borg-Warner automatic overdrive (making Riley Europe's first B-W customer, incidentally). Finally, on the Nuffield takeover all these underfloor delights went out through the window and the customer was stuck with a hardy but orthodox four-speed synchromesh transmission.

Pre-war, when British body designers still had souls of their own and weren't forever swiveling one eye towards Milan and the other at Detroit, Rileys were always a comely breed. All their bodies — sports, convertible or sedan, had a balance and grace that usually put them at the top of their class in Concours D'Elegance. The Monaco of 1926 was one of the first non-custom bodies in the world with a built-in trunk of a shape containing the germs of the notched back fashion. Six years later the Kestrel sedan pioneered the follow-through arc from the highpoint of the roof to the rear bumper—a style immortalized in Riley huckster jargon as Aero-Line Design and illustrated with pictures of visible air obediently parting itself down the middle and cocooning the Kestrel in a vacuum. The Falcon of 1934 had two upward hinging roof panels which automatically lifted when the front doors were opened and shut down when they were closed — an anti-scalping measure which may conceivably have been the inspiration of Mercedes' gullwing port cullis on the 300 SL.

The three habitable sports two-seater Rileys of the 30's — as distinct from the stripped-for combat Brooklands types—had a purposeful beauty of their own, too. These were the eleven-hundred Imp and the six-cylinder M.P.H. of 1935, with long, narrow hoods widening rearward to duck's-fanny tails; and the wieldly Sprite which superceded them in '36 — a 1½ liter four developing 60 bhp and embodying many of the mechanical features of the previous year's T.T. winner.

The Sprite was the last sports car ever marketed by Riley, if you don't count the post-war three-seat, tail-heavy roadster introduced in 1948 and dropped after an unspectacular production run of about three years duration. The roadster had the present 2½ litre four-cylinder engine and was good for a genuine 100 mph. This I know because the one road I tested on the Jabbeke Highway in September of '48, immediately in the wake of Goldie Gardner's international mile and kilometer records with the Jaguar powered version of his streamliner, seized solid at almost exactly the century. (A core plug had dropped out, emptying the cooling system.)

A study of Riley specifications over the past couple of decades reveals that in the engine department at any rate the marque has broken records for continuity. The dimensions of the '56 Pathfinder, which is the sole production of Riley's present-day plant at Abingdon, Berkshire, are precisely the same as those of the Foleshill-built Blue Streak of mid-1937: namely 80½ by 120 millimeters. These Swanee whistle measurements also show that in this age of the square and over-square engine, Riley is not to be intimidated by bogeyman talk about relative piston and highway speeds. The typical Riley owner, encouraged by standards of roadability that are well above average in any country's language, drives fast.

Riley's oldtime zeal for experiment and novelty did not extend to suspension matters. Special racing rigs excepted, it wasn't until post-war times that they discarded the "well tried" beam front axle in favor of Independent Front Suspensions. Currently, however, the Pathfinder, with its torsion bars at the front and coils in back, at least can claim to be "all independent of the leafy spring," in Keats' convenient phrase. *Dennis May*

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Veloce

(Continued from page 37)

the speed by 50% for the longer upper chain. The upper chain is easily adjustable by means of an idler sprocket. The aluminum head has ferrous valve seat inserts with the valves themselves disposed at an included angle of 80°. The 14 mm spark plug is located in the center of the hemispherical combustion chamber equi-distant between the two valves. Porting is typically Alfa in that it is as "straight through" as you can get it.

The separate camshafts are carried on plain bearings and operate the valves through the now almost universal process of hardened-steel cups that fit over the valve springs. Adjustments for tappet clearances are made by use of small steel buttons between cup and valve end. Double-nested helical springs are used with conventional retainers and Chevrolet type keepers.

The alloy Mondial pistons are domed supplying a ratio of nine to one. Reliefs are cut in the dome for the valves and two compression rings and one scraper, or oil control ring, is used. The short connecting rod carries a wrist-pin with a tapered I.D. that is retained by circlips. The big end of the rod splits at right angles to the cylinder bore with two bolts retaining the cap.

The electrical system is 12 volt Morelli throughout with the generator driven by pulley and belt from the front of the crankshaft. The distributor has a centrifigal advance mechanism that accounts for 30 of the 40 degrees advance. The usual vacuum brake on the advance mechanism has been omitted.

INTAKE-EXHAUST

Carburetion layouts on Italian racing machinery have a way of making you wonder where the money comes from. This one is no exception. Two dual-throat Weber sidedrafts almost dwarf the engine. Called Tipo 205, the throat diameter is 40 mm (1.6 inches). These bolt directly to the head fulfilling the one cylinder—one carburetor theory. Ram tubes are dispensed with by the use of a massive cast alloy balance box that is fed cool air through a large diameter flexible tube after passing through an air cleaner. Apparently there is a choice of either picking the air up under pressure through the ventilator aperture in the left front fender, or by re-routing the tubing, from the interior of the cockpit.

The exhaust system features split headers with two common collector chambers and terminates in a single pipe in the rear. Pipes one and four join gracefully about 20 inches from the port and enter the first collector chamber just under the cockpit. Pipes two and three follow the same pattern. The second collector chamber is near the rear of the chassis with the single tail pipe ending at the body line. In case anyone is interested, the Alfanese for collector chamber is "lung."

The clutch is a conventional single dry plate. The gearbox has four forward speeds—all syncromesh. The gearbox housing is cast alloy. The method of transmitting the drive from gearbox to rear axle is of special interest in that the driveshaft is in two separate sections. The first section attaches to the back of the gearbox by means of a rubber universal and is carried at its other end by a ball bearing mounted to the chassis. The second section carries universal joints on both ends to allow for movement of the rear axle.

The cockpit appointments are luxurious for an Italian racing sports car. Bucket seats are softly upholstered, leather covered and adjustable. The floor gearshift lever is on an impressive size and convenient to handle. Clutch, throttle and brake levers are conventionally located. The addition of a raised rest for the left foot just clear of the clutch pedal is a nice thought.

Cockpit ventilation is provided by a flexible tube that picks up air from a vent located in the right front fender. The wind screen is of the small pre-1956 Le Mans type and is formed of plastic.

Instruments include a large tachometer and speedometer in addition to the usual temperature, oil pressure and electrical gauges. The tachometer is not red-lined, but it would seem reasonable that 6500 rpm would be maximum revs as claimed. However, one owner casually mentioned seeing 7600 in top at an indicated 130 mph—something the mechanics in Milano, who carefully assembled this engine, would be glad to hear.

The longer you consider it the more obvious it becomes that this car, for all its tininess is a true Alfa and will make its mark on the automotive world as surely as did the 2.9.

It's inevitable that production 1290 cc chassis and engines will fall into the hands of the U. S. specials builders and with or without the lead supplied by the factory in the Veloce, Alfa Specials are going to be tough contenders for the silverware.

— Russ Kelly

(Continued from page 56)

proper idle speed (550 rpm) for declutching, with engagement at 700 rpm —no more, no less. One half a turn of carburetor jets without an exact compensating of shift unit timing can cause anything from limping home to taking trains. The intake manifold is water heated, the oil pan is an aluminum casting, the shrouded fan has nylon blades (that merely sting fingers at idle!), and the low pressure cooling system uses anti-freeze (glycol) at 15 degrees below zero protection *all year around*. (Car comes with anti-freeze.)

Next comes the main attraction—a seven cylinder swashtype pump, belt-driven off the engine's right front (behind transmission) on an adjustable mount. Drawing Lockheed hydraulic fluid #55 from a tank reservoir located ahead the radiator to the right, this unit pumps at high pressure into a main accumulator below the reservoir. This accumulator has a spherical section containing fluid at constant pressure, with metering valves. It feeds four suspension accumulators, two brake units, the power steering unit, and the shift unit, each then exhausting into the main reservoir in endless cycle (or until some particle of dirt finds its way into the lines and jams one of the many needle-fine valves.)

The suspension units look like large shock absorbers with an accumulator sphere on one end. Roughly, that's what they are, with pistons linked to articulating arms on which the independent action wheels are end mounted. The piston head moves varied amounts of fluid against a rubber diaphragm in the sphere's center, which compresses an inert gas sealed in the upper half of the sphere. The gas is the "spring". The fluid is pressure fed in graded quantities, according to car load, front and back. Two valves in the unit control hydraulic pressure in damping fashion, acting as "shock absorbers". These valves can cause hydraulic squeals ranging from gentle yipes to prolonged howls—should certain high frequency vibrations occur due to thinned oil on hot days or any extreme heat condition. Some cars have come through with howls that required valve closing springs of different rate fitted to effect a cure. This condition can occur on other valve units throughout the cars, and seems somewhat produced by fate, as one vehicle will have one squeal condition and the next be entirely different. All DS 19 cars squeal slightly at times when very hot.

Power operation of the rack and pinion type steering is by means of a hydraulic cylinder with piston lined by rod to the rack. Fluid is admitted at one or the other end of the cylinder in ratio to manual effort on the steering wheel, with control valves located under the car's battery. With power on, there is no contact between steering shaft end and rack. With power off, a striking plate that normally operates valve action travels slightly further and hits the valve body to achieve direct mechanical action to pinion on rack. (With FWD, this action is more than a handful for Lady pilots). There is a simple screw-set mechanism on the "straight line steering" spring loaded cam device located near the foot of the steering column. Handily located, this unit upon normal wear can cause a definite right or left side steering pull (that will make many "experts" swear that the entire steering is out of line!) The unit provides a centering point that no other power steering boasts, thus achieving a good impression of real steering "feel".

The single dry disc clutch is actuated by an hydraulic cylinder. A valve either admits fluid from a main accumulator for clutch disengagement, or releases it for engagement under action of a return spring. A twin stage control is utilized, with a separate pressure pump actuating the clutch for car start and then caused to bypass its power in continuous cycle when engine exceeds 700 rpm. The second stage shifts gears when rpm exceeds 700, and features a two-valve control for either rapid or slow, smooth

(Continued on page 64)

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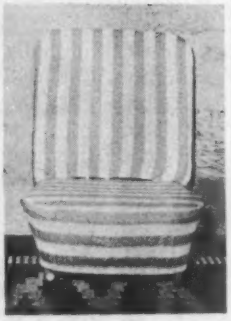

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(Continued from page 63)

shift dependent on urge at gas treadle. The larger valve quickly evacuates the fluid in the clutch cylinder. The smaller valve delays clutch re-engagement.

The shift lever system activates individual hydraulic cylinders at the gear boxes selector fork ends, with pistons linked to the forks fully engaging each gear. It is evidently not an entirely foolproof gear change method, as one car in the Citroën shop was suffering an expensive ailment caused by inept clutch handling. At no time during tests, however, did the clutch perform poorly other than to lag.

An over-all look at the DS 19 service requirements tells that no ordinary shop can attempt even small adjustments to the hydraulic system unless under supervision of factory-trained staff, or upon consulting and comprehending an exhaustive shop manual, which, at the moment, is in preparation. It would be very wise for owners to obtain this manual when it becomes available and work from it personally, or while supervising a patient mechanic preferably from aircraft shops where the work principle of neatness—required for hydraulic repair—is deeply drilled into every involuntary movement. General accessibility is not bad as first glance indicates, and as both front fenders are held on by a bolt front and back, removal opens up the works for action quickly and adequately. The rear fenders are removed for wheel change with one bolt (nice plated) protruding through rearmost contour. All wires are color coded, all nuts, bolts, metric. The present French battery should not be allowed to discharge completely, as it usually fails to recharge thereupon.

The park brakes serve two purposes, being linked by cable to the front disc shoes, and also to a dog cam that will, when required, take up the disc friction plates (shaped as a top-sawed-off keystone and merely dropped into slots when replaced.) This "automatic" brake adjustment is very ingenious, being the key to public-operated disc systems, and can cause the owner temporary alarm by occasionally creating brake smell upon initial set. Upon foot depressing, the brake locks in ratchet, is released upon pulling an under-dash button at door line. Hence, it is not the ideal second brake, but does most safely check the car at average speeds. Parking in gear is possible, but requires use of the remote, under dash, manual clutch control, hence the foot brake "gets used."

Seats are designed for ideal posture, have nylon-jersey on foam rubber upholstery with support by very light, entwined coil springs set every three inches. Just how long this type construction will hold up without sag is something we don't know . . . but while it lasts, it is most luxurious.

The no-draft ventilation as designed by Citroën eliminates side vane windows by means of defusers on the extreme sides of the instrument panel. These vents have adjustable openings leading to intakes under the fenders above the front wheel suspension. (At night, headlight illumination may be seen through these plastic lattices.) Vents serve in winter for heating from a water unit, with control by large knob on the engine wall under panel center. Heating efficiency is such that the DS 19, when subject to minus 25 degree centigrade in Sweden, provided interior heat of plus 18 degrees. Just above the heat knob, under the dash, is a pull knob that provides manual control for window wipers. These wipers drop below the hoods trailing edge when not in use, and are most efficient on regular automatic electric action.

The instruments consists of gas gauge, and ammeter below the speedometer. Speedometer may read kilometers or mph, depending on the date of import. There is no oil pressure or water temperature gauge — no one knows why. Warning lamps include a center red oblong to tell if brake pressure lowers (then you still have up to 70 stops reserve if the leak is not major), very dim, green blinker arrows seen best after dark, and a bright-lights red spot.

Economy tests showed 22 mpg under hard driving, 28 mpg average cross country, 33 mpg at economy speeds (34 mph in 2nd, 50 mph in 3rd, 68 mph in top). Wide-out racing gave 14 mpg on a four mile test.

Brake tests included successive stops from 50 mph, with no fade or loss of retard measurable. Brakes were applied full at 90 mph on an eleven percent downgrade, start was instantly made, obtaining a speed of 68 mph on the same grade, followed by full brake to stop—with no fade. Brakes on one car chattered slightly, due to the single screw holding disc plate being slightly loose.

Top speed was precision timed at 90 mph on one car,, read 94 mph on another car tailed by Corvette with accurate speedometer. Acceleration rates varied widely due to shift unit's inconsistent performance on most cars. The best (specially tuned by Citroën for test) reading by corrected speedometer was seven seconds to 37 mph, 12 to 50 mph, 16 to 62 mph, 24 to 68 mph, 30 to 75 mph. Speedometer error was very small in all cars, averaging two mph fast through the range.

Without a doubt, the Citroen DS 19 is the current be-all and end-all of automotive gadgetry, but above and beyond that, it is an enthusist's car . . . that is if the enthusiast is not so simon-pure that he can't stomach having oil do his work for him. —*Ben West*

Simca-1300

(Continued from page 29)

The finish and interior details of our *Grande Large* model were nicely executed. The designers chose plastic upholstery for side panelling and the bolsters at the tops of the seats, but, where body-breathing is a factor, used coarse-woven fabrics that let the air circulate and give good body traction. The rake of the front-seat backs is easily adjustable by means of set screws. When these seat backs are folded forward an ingenious linkage moves the entire seat ahead to widen the passage for rear-seat entry or exit.

The car's controls are simple, attractive, and except for an out-of-the-way horn ring, handy. Our pillarless hardtop model slipped through the wind silently at high speeds and even with all the windows down had no air turbulence in the front-seat area; passengers in the rear – inevitably – felt the wind at cruising speeds. With windows up the car was quite water-tight, but the rubber seals around the luggage compartment leaked copiously—a defect that could be easily and inexpensively corrected. A high seating position and plenty of glass make for good visibility, but the rear view mirror is too small to take advantage of the broad vista at the rear – another easily remediable defect. The heater-defroster unit is well made and behaved very efficiently at the moderately low temperatures we encountered. Luggage space is good by light car standards.

Prices for the more luxurious Aronde models climb steeply once they leave the bread-and-butter car base point. The *Eylsée* four door, with more trim than the basic model, costs 1732 at port of entry, the two door *Grande Large* hard top is $1949, the chic and luxurious *Coupe de Ville* two-seater is $2595 and the equally handsome two-place convertible is $2795. The heater and defroster cost an extra $47 and if you want whitewall tires (which are hard to avoid getting) you pay another $20.

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Paramount Ranch

(Continued from page 31)

The tussle for top spot in the over 1500 cc category was between Harrison Evans' Monza Ferrari and the Buick-powered Morgenson Special, which was driven by Eric Hauser after his previous mount had been barred from further competition because of handling characteristics that were considered somewhat less than adequate.

Hauser immediately took out in front, but held it for only twenty minutes before Evans moved into a lead that wasn't threatened until the final minutes of the hour-long race. Despite closing ground rapidly, Hauser was unable to overhaul the Ferrari and Evans shattered a nearly perfect record for unsuccessful, if enthusiastic, endeavor by finishing two seconds ahead. Ginther was third, followed by Bill Krause and Harold Erb in D-Jaguars.

On Saturday, Hauser had rolled to a win without serious contention from the Ferrari – finishing three seconds ahead of Krause and 26 seconds ahead of Evans, who trailed in third.

For all the fine weather, interesting races and financially profitable attendance, the week-end finished on something of a sour note as a heated debate flared up when Ed Kretz (whose vigorous driving techniques have been forged by 30 years of automobile and motorcycle racing) and Rudy Cleye (an almost proverbial winner in the production races) were black flagged for erratic driving in Sunday's main event.

Actually, the verbal pyrotechnics weren't set off by these instances alone, but were the culmination of what many considered a period of under-worked judgments and over-worked black flags that resulted when the club attempted to make a useful job out of the previously meaningless and uually honorary title of race judge.

No official announcement has been forthcoming concerning the handling of these cases, but statements of officials involved indicate that the charges were dismissed and that improvements in the judging set-up are now under consideration.

One more sports car race is slated for the Paramount site before the year's end, and future events will be limited to three a year. The only other competition meets even being considered at the moment are a brace of races for the stock cars.

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